PROCEEDINGS

OF THE

AMERICAN SOCIETY

OF

CIVIL ENGINEERS

(INSTITUTED 1852)

VOL. XLI—No. 3

MARCH, 1915

Edited by the Secretary, under the direction of the Committee on Publications.

CONTENTS

Society Affairs.....Pages 149 to 202.
Papers and Discussions.....Pages 521 to 786.

NEW YORK 1915

American Society of Civil Engineers

OFFICERS FOR 1915

President, CHARLES D. MARX

Vice-Presidents

Term expires January, 1916:
CHARLES F. LOWETH
GARDNER S. WILLIAMS

Term expires January, 1917:
DANIEL BONTECOU
CLEMENS HERSCHEL

Secretary, CHARLES WARREN HUNT

Treasurer, LINCOLN BUSH

Directors

Term expires January, 1916:	*Term expires January, 1917:*	*Term expires January, 1918:*
JAMES H. EDWARDS	GEORGE W. FULLER	JOHN V. DAVIES
HENRY W. HODGE	ARTHUR S. TUTTLE	GEORGE A. HARWOOD
LEONARD METCALF	CHARLES H. KEEFER	J. E. GREINER
HENRY R. LEONARD	MORTIMER E. COOLEY	JOHN F. COLEMAN
EDWARD H. CONNOR	EUGENE E. HASKELL	JOHN B. HAWLEY
SAMUEL H. HEDGES	RICHARD MONTFORT	HERBERT S. CROCKER

Assistant Secretary, T. J. McMINN

Standing Committees

(THE PRESIDENT OF THE SOCIETY IS *ex officio* MEMBER OF ALL COMMITTEES)

On Finance:	*On Publications:*	*On Library:*
HENRY W. HODGE	JAMES H. EDWARDS	GEORGE A. HARWOOD
CLEMENS HERSCHEL	ARTHUR S. TUTTLE	JOHN V. DAVIES
GEORGE W. FULLER	J. E. GREINER	HERBERT S. CROCKER
LEONARD METCALF	HENRY R. LEONARD	M. E. COOLEY
JOHN F. COLEMAN	GARDNER S. WILLIAMS	CHAS. WARREN HUNT

Special Committees

ON CONCRETE AND REINFORCED CONCRETE: Joseph R. Worcester, J. E. Greiner, W. K. Hatt, Olaf Hoff, Richard L. Humphrey, Robert W. Lesley, Emil Swensson, A. N. Talbot.

ON ENGINEERING EDUCATION: Desmond FitzGerald, Onward Bates, D. W. Mead.

ON STEEL COLUMNS AND STRUTS: Austin L. Bowman, James H. Edwards, Charles F. Loweth, Rudolph P. Miller, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard, George W. Tillson, Nelson P. Lewis, Charles J. Tilden.

ON VALUATION OF PUBLIC UTILITIES: Frederic P. Stearns, Charles S. Churchill, Leonard Metcalf, William G. Raymond, Henry E. Riggs, Jonathan P. Snow, William J. Wilgus.

TO INVESTIGATE CONDITIONS OF EMPLOYMENT OF, AND COMPENSATION OF, CIVIL ENGINEERS: Nelson P. Lewis, S. L. F. Deyo, Dugald C. Jackson, William V. Judson, George W. Tillson, C. F. Loweth, John A. Bensel.

TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, Edwin Duryea, Jr., James C. Meem, Walter J. Douglas, Samuel T. Wagner.

ON A NATIONAL WATER LAW: F. H. Newell, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, Charles D. Marx, Gardner S. Williams.

ON FLOODS AND FLOOD PREVENTION: C. McD. Townsend, John A. Bensel, T. G. Dabney, C. E. Grunsky, Morris Knowles, J. B. Lippincott, Daniel W. Mead, John A. Ockerson, Arthur T. Safford, Charles Saville, F. L. Sellew.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, Robert W. Hunt, George W. Kittredge, Paul M. LaBach, C. G. E. Larsson, William McNab, G. J. Ray, Albert F. Reichmann, F. E. Turneaure, J. E. Willoughby.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....1446 Circle.
CABLE ADDRESS.....“Ceas, New York.”

Vol. XLI. MARCH, 1915. No. 3.

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed in its publications.

SOCIETY AFFAIRS

CONTENTS

	PAGE
Minutes of Meetings:	
Of the Society, February 17th and March 3d, 1915	149
Of the Board of Direction, March 2d, 1915	154
Announcements:	
Hours during which the Society House is open	155
Future Meetings	155
Annual Convention	155
Searches in the Library	155
Papers and Discussions	156
Local Associations of Members of the American Society of Civil Engineers	157
Minutes of Meetings of Special Committees	160
Privileges of Engineering Societies Extended to Members	162
Accessions to the Library:	
Donations	164
By purchase	169
Membership (Additions, Changes of Address, Reinstatements, Deaths)	170
Recent Engineering Articles of Interest	177

MINUTES OF MEETINGS OF THE SOCIETY

February 17th, 1915.—The meeting was called to order at 8.30 P. M.; Austin L. Bowman, M. Am. Soc. C. E., in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 158 members and 22 guests.

A paper by William G. Grove, Esq., and Henry Taylor, Assoc. M. Am. Soc. C. E., entitled "Reconstruction of the Norfolk and Western Railway Company's Bridge over the Ohio River at Kenova, West Virginia," was presented by Mr. Grove and illustrated with lantern slides. The paper was discussed by Messrs. T. Kennard Thomson, F. W. Skinner, Otis E. Hovey, and W. J. Boucher. A communication on the subject from C. H. Cartlidge, M. Am. Soc. C. E., was read by the Assistant Secretary.

Adjourned.

March 3d, 1915.—The meeting was called to order at 8.30 P. M.; Vice-President Gardner S. Williams in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 132 members and 21 guests.

The minutes of the Annual Meeting, January 20th, and of the meeting of February 3d, 1915, were approved as printed in *Proceedings* for February, 1915.

The Chairman appointed Messrs. A. H. Van Cleve, F. W. Skinner, and J. H. Granbery as Tellers to canvass the ballot on the following proposed amendment to the Constitution:

Amend Article VII—Nomination and Election of Officers—as follows:

Strike out Section 1, and substitute the following:

"The Board of Direction shall, from time to time, divide the territory occupied by the membership into thirteen geographical districts, to be designated by numbers. District No. 1 shall be the territory within fifty miles of the Post Office in the City of New York. Each of the other districts shall be, as nearly as practicable, contiguous territory, and shall be designated as Districts Nos. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, and 13. The Board shall announce such division to the Society on or before the first day of March in each year."

Strike out the first paragraph of Section 2, and substitute the following:

"At the Annual Meeting of each year, seven Corporate Members, not officers of the Society, shall be appointed by the meeting to serve for two years. They shall be selected so as to provide, with the seven members holding over, two members from District No. 1, and one from each of the remaining twelve Districts; and these, with the last five living Past-Presidents of the Society, shall be a committee to nominate officers for the Society."

Strike out the word "and" in the fifteenth line of the third paragraph of Section 2, and after the figure "7" add: "8, 9, 10, 11, 12, and 13."

The Tellers reported as follows:

Total number of ballots received		1178
Unsigned	13	
From those in arrears for dues	8	
Stamped, not signed	2	23
Ballots canvassed		1155
Voting Yes		1066
No		83
Blank ballots (not marked)		6

The Chair declared the amendment carried.

A paper, entitled "Cinder Concrete Floor Construction Between Steel Beams", by Harold Perrine and George E. Strehan, Juniors, Am. Soc. C. E., was presented by Mr. Strehan and illustrated with lantern slides. A communication on the subject from K. M. Boorman, Esq., was read by the Assistant Secretary, and the paper was discussed orally by Messrs. Guy B. Waite, T. Hugh Boorman, Albert Oliver, Ira H. Woolson, M. S. Falk, and George E. Strehan.

The Assistant Secretary announced the election of the following candidates on March 2d, 1915:

As Members

Alfred Francis Théard, New Orleans, La.
John Wilson, Austin, Tex.

As Associate Members

Gault Applegarth, Baltimore, Md.
Ernest Ruby Bear, Wheeling, W. Va.
Arthur Bryan, Birmingham, England
Frank Joseph Conlon, Brooklyn, N. Y.
William Carey Cram, Jr., Raleigh, N. C.
Robert Menees Davis, Newman, Cal.
Carl S. Donaldson, Beaver Falls, Pa.
James Lumnsden Ferebee, Atlantic City, N. J.
Douglass Hewitt Ferry, San Diego, Cal.
Roy Warner Gausmann, Brown Station, N. Y.
Herbert Ellsworth Howes, Minneapolis, Minn.
Charles Reginald Hughes, Lima, Ohio
Herbert Alfred Jackson, Melbourne, Victoria, Australia
Wesley Eugene King, St. Paul, Minn.
Percy Hugh Marshall Macintosh, Sydney, New South Wales, Australia
John Alexander Norris, Wharton, Tex.
Benjamin Simpson Philbrick, Santa Rosalia, Chih., Mexico
Nathan Schein, Pittsburgh, Pa.
Frederick Robert Sites, Shanghai, China
James Elmo Smith, Urbana, Ill.
Julien Smith, Selma, Ala.
Thomas Henry Strate, Aberdeen, S. Dak.
Harold Warner Streeter, Cincinnati, Ohio
Carl Stuetzel, Jr., Boston, Mass.
George Eliott Sturt, Sault Ste. Marie, Mich.
Oscar Gowen Thurlow, Birmingham, Ala.
Arthur John Turner, Long Lake, Wash.
Guy Vroman, Larchmont, N. Y.

AS JUNIORS

FRANK STORK ALTMAN, Atchison, Kans.
DARIO BRESSANE, Campanha, Minas Geraes, Brazil
CARLYLE HUGO BRYSON, Lima, Ohio
IVAN CHARLES CRAWFORD, Boulder, Colo.
JOHN JAMES GAULT, Bocas del Toro, Panama
LEWIS MERRICK HAMMOND, Provo, Utah
WILLIAM JOHN KREFELD, New York City
JOSEPH MASTELLA LEGRAND, Clarkdale, Ariz.
SAMUEL BROOKS MORRIS, Pasadena, Cal.
RUSSELL MOORE ROBINSON, Dayton, Ohio
HAROLD AUGUST HASTRUP SCHULTZ, Detroit, Mich.
CHARLES MARIA WEBER, Ithaca, N. Y.
ALPHONSE MUELLER WESTENHOFF, Cincinnati, Ohio
HENRY WILLCOX, West New Brighton, N. Y.

The Assistant Secretary announced the transfer of the following candidates on March 2d, 1915:

FROM ASSOCIATE MEMBER TO MEMBER

HARRY EDMUND BILGER, Springfield, Ill.
CON MORRISON BUCK, Topeka, Kans.
ADAM LEONARD BUSH, Los Angeles, Cal.
ROSS MILLER COOMER, Sioux City, Iowa
LOUIS CHRISTIAN DATZ, New Orleans, La.
HARRY WESTBROOK DEGRAFF, Amsterdam, N. Y.
THOMAS ALVIN GILKEY, New Castle, Pa.
CARLETON GREENE, New York City
OSCAR LLEWELLYN GROVER, Washington, D. C.
JULIUS LILIEN JACOBS, Houston, Tex.
CHARLES AUGUSTIN WOODLEY MUSSON, Butte, Mont.
RALPH FENNO PROCTOR, Baltimore, Md.
FREDERIC ADAMS REIMER, East Orange, N. J.
THOMAS RIGGS, JR., Washington, D. C.
ELWYN EGGLESTON SEELYE, New York City
ADELBERT ALONZO WEILAND, Pueblo, Colo.
THAD LOREN WILSON, New York City

FROM JUNIOR TO ASSOCIATE MEMBER

JAMES MADISON BARKER, Boston, Mass.
JOHN CLEAVELAND BEEBE, Richfield, Idaho
JOHN HENRY BRINGHURST, Ann Arbor, Mich.
MASSENA LARON CULLEY, Jackson, Miss.
RALPH SAMUEL GRAM, Toledo, Ohio

George Elias Halstead, LaFayette, Ind.
Horace Parlin Hamlin, New York City
Charles Jacob Hyer, Tampa, Fla.
Frank Henry Macy, Dansville, N. Y.
Wilfred Lincoln Rowe, Meadow Creek, Wash.
William Lee Selmer, New York City
Horatio Seymour, Jr., Bronxville, N. Y.

From Junior to Associate

Roger Leroy Morrison, College Station, Tex.

The Assistant Secretary announced the following deaths:

Frank Olin Marvin, of Lawrence, Kans., elected Member, May 5th, 1897; died February 6th, 1915.

Saint George Henry Cooke, of Philadelphia, Pa., elected Associate Member, January 5th, 1909; died January 12th, 1915.

Harold Hansen Fitting, of San Francisco, Cal., elected Junior, May 2d, 1911; Associate Member, September 3d, 1913; died January 7th, 1915.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

March 2d, 1915.—The Board met at 4.40 P. M., President Marx in the chair; Chas. Warren Hunt, Secretary, and present, also, Messrs. Bontecou, Coleman, Crocker, Davies, Endicott, Greiner, Herschel, Montfort, Ockerson, Swain, Tuttle, and Williams.

Mr. Hunt presented a draft of a Bill prepared by a Joint Committee of the National Engineering Societies with the resolutions adopted by that Committee February 4th, 1915, as follows:

"*Resolved:* That the Members of this Joint Committee present to their respective governing bodies an official copy of the Act as finally adopted by the Committee, with the suggestion that it be used, should it become necessary, in connection with legislation on the subject.

"*Resolved:* That the Joint Committee having completed the task assigned to it, in so far as it has been able to do so, requests that it be discharged."

Robert Ridgway and Chas. Warren Hunt were, in accordance with this resolution and their request, discharged as representatives of this Society on said Committee.

Edwin Duryea, Jr., was appointed a member of the Committee of Management of the International Engineering Congress, 1915, to fill the vacancy caused by the election of Mr. Marx, by virtue of which he becomes a member of the Committee on Participation.

A proposed amendment to the Constitution of the Philadelphia Association of Members of the Society was approved.

A proposed revision of the Constitution of the Atlanta Association of Members of the Society was approved.

General Grenville Mellen Dodge was elected an Honorary Member by the unanimous vote of the Board of Direction and of all living Past-Presidents.

The resignations of 2 Members, 4 Associate Members, and 3 Juniors were accepted.

Ballots for membership were canvassed, resulting in the election of 2 Members, 28 Associate Members, and 14 Juniors, and the transfer of 1 Junior to the grade of Associate, and 12 Juniors to the grade of Associate Member.

Seventeen Associate Members were transferred to the grade of Member.

Applications for membership were considered and other routine business transacted.

Adjourned.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

April 7th, 1915.—8.30 P. M.—A regular business meeting will be held, and a paper by R. M. Strohl, Jun. Am. Soc. C. E., entitled "The St. John Levee and Drainage District of Missouri", will be presented for discussion.

This paper is printed in this number of *Proceedings.*

April 21st, 1915.—8.30 P. M.—At this meeting a paper by Adolph F. Meyer, M. Am. Soc. C. E., entitled "Computing Run-Off from Rainfall and Other Physical Data", will be presented for discussion.

This paper is printed in this number of *Proceedings.*

ANNUAL CONVENTION

The Annual Convention of the Society will be held in San Francisco, Cal., September 16th, 17th, and 18th, 1915, being the Thursday, Friday, and Saturday immediately preceding the International Engineering Congress, which is to be held during the week beginning September 20th.

Three of the other National Engineering Societies, under whose auspices the International Engineering Congress is to be held, will also hold meetings in San Francisco at about that time.

Arrangements will be made for a special train, and possibly more than one train, to accommodate the members of all of these Societies who wish to attend their own meeting as well as the Congress.

This matter is in the hands of a Joint Committee of representatives of these organizations, and it is expected that within a short time a circular will be mailed to the entire membership of these Societies (some 28 000), giving in detail a schedule of train service, railroad and hotel rates, etc.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that if it were generally known to the

membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In making a search it sometimes happens that references are found which are not readily accessible to the person for whom the search is made. In that case the material may be reproduced by photography, and this can be done for members at the cost of the work to the Society, which is small. This method is particularly useful when there are drawings or figures in the text, which would be very expensive to reproduce by hand.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which from their mathematical or technical nature, in the opinion of the Committee are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions only will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

The Board of Direction has adopted rules for the preparation and presentation of papers, which will be found on page 429 of the August, 1913, *Proceedings*.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Meeting of Presidents of Local Associations

A meeting of the Presidents or representatives of the fourteen Local Associations of Members of the American Society of Civil Engineers was held at the House of the Society on January 19th, 1915, the day preceding the Annual Meeting. A Report in Full of the Proceedings of this meeting will be published in the April *Proceedings*.

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M., every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest.

(Abstract of Minutes of Meeting)

December 18th, 1914.—The Tenth Annual Meeting was called to order; President Snyder in the chair; E. T. Thurston, Jr., Secretary; and present, also, 80 members and guests.

Mr. C. E. Grunsky, for the Committee on Headquarters for the Annual Convention, reported that satisfactory arrangements had been made with the Hotel St. Francis. On his motion, it was voted to offer the assistance of the Association to the Board of Direction in the selection of the Entertainment Committee for the Convention.

Mr. Thurston, for his committee, reported that the Engineers' Club of San Francisco would be pleased to make arrangements with the Association relative to holding the weekly luncheons in its new quarters as soon as they were ready.

The Reports of the Treasurer and Secretary were read and adopted.

On motion, duly seconded, President Snyder was instructed to appoint a Committee of three to draft suitable resolutions of sympathy to the family and relatives of the late W. R. Eckart, M. Am. Soc. C. E. Messrs. C. E. Grunsky, Hermann Schussler, and A. M. Hunt were subsequently appointed.

The following officers were elected: President, A. M. Hunt; Vice-President, M. C. Couchot; Secretary, E. T. Thurston, Jr.; and Treasurer, P. E. Harroun.

Mr. J. D. Galloway addressed the meeting on "The Installation of Unit No. 5 at the Las Plumas Power Station of the Great Western Power Company", illustrating his remarks with stereopticon views.

The paper was discussed briefly by Messrs. A. M. Hunt, Rhodin, Homberger, Doble, and Galloway.

Adjourned.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers (Denver, Colo.) are held on the second Saturday of each month, except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, Roger W. Toll, 700 Tramway Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, at 12.30 P. M., at the Albany Hotel.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

February 6th, 1915.—The meeting was called to order; President Vincent in the chair; Roger W. Toll, Secretary; and present, also, 28 members and guests.

The minutes of the January, 1915, meeting were read and approved.

The Secretary reported that the ballot taken regarding the day of the monthly meeting and time of the dinner, showed a decided preference for Saturday evening and a 6 o'clock dinner.

Communications were read from the Secretary of the Society, Mr. G. N. Houston, and others.

President Vincent reported on the Conference of the Presidents of the Local Associations held in New York City on January 19th, 1915.

A report for the Committee on Licensing Civil Engineers was presented by Mr. John E. Field, and the subject was discussed by Messrs. Leonard Metcalf, H. S. Crocker, and others.

A paper on "The Drainage of Irrigated Lands" was presented by Mr. D. W. Murphy, who illustrated his remarks with stereopticon views, and there was a general discussion of the subject.

A vote of thanks was tendered Mr. Murphy for his interesting paper.

Adjourned.

Atlanta Association

The Atlanta Association of Members of the American Society of Civil Engineers was organized on March 14th, 1912. The Association holds its meetings at the University Club, Atlanta, Ga.

At the meeting of the Association on January 9th, 1915, the following officers were elected for the ensuing year: President, Park A. Dallis; First Vice-President, B. M. Hall; Second Vice-President, P. H. Norcross; Secretary-Treasurer, T. P. Branch.

Baltimore Association

On May 6th, 1914, the Baltimore Association of Members of the American Society of Civil Engineers was organized, a Constitution

adopted, and the following officers were elected: J. E. Greiner, President; Francis Lee Stuart, First Vice-President; L. H. Beach, Second Vice-President; Harry D. Williar, Jr., Secretary-Treasurer; and Messrs. H. D. Bush, B. T. Fendall, B. P. Harrison, Calvin W. Hendrick, Oscar F. Lackey, M. A. Long, and A. A. Thompson, Directors.

At its meeting of September 2d, 1914, the Board of Direction considered and approved the proposed Constitution of the Baltimore Association of Members of the American Society of Civil Engineers.

Cleveland Association

At its meeting of January 6th, 1915, the Board of Direction considered and approved the proposed Constitution of the Cleveland Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, Willard Beahan; Vice-President, Robert Hoffmann; Secretary-Treasurer, George H. Tinker.

Louisiana Association

The Louisiana Association of Members of the American Society of Civil Engineers (New Orleans, La.) has been organized with the following officers: Frank M. Kerr, President; J. F. Coleman, and W. B. Gregory, Vice-Presidents; A. M. N. Blamphin, Treasurer; and L. C. Datz, Secretary.

Northwestern Association

At its meeting of November 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Northwestern Association of Members of the American Society of Civil Engineers (St. Paul and Minneapolis, Minn.). F. W. Cappelen is President and R. D. Thomas, Secretary.

Philadelphia Association

The meetings of the Association are held at the Engineers' Club of Philadelphia, 1317 Spruce Street.

At the meeting of the Association on October 5th, 1914, the following officers were elected for the ensuing year: President, Richard L. Humphrey; Vice-Presidents, F. Herbert Snow and William Hunter; Directors, John Sterling Deans, John W. Ledoux, Edgar Marburg, and H. S. Smith; Treasurer, S. M. Swaab; and Secretary, W. L. Stevenson.

Portland, Ore., Association

At the meeting of the Association on October 21st, 1914, the following officers were elected for the ensuing year: President, George C. Mason; First Vice-President, W. S. Turner; Second Vice-President, John T. Whistler; Treasurer, G. B. Hegardt; and Secretary, Charles J. McGonigle.

St. Louis Association

At its meeting of October 7th, 1914, the Board of Direction considered and approved the proposed Constitution of the St. Louis Association of Members of the American Society of Civil Engineers.

The following officers have been elected: President, J. A. Ockerson; First Vice-President, Edward E. Wall; Second Vice-President, F. J. Jonah; Secretary-Treasurer, Gurdon G. Black. The meetings of the Association are held at the Engineers' Club Auditorium.

Seattle Association

The Seattle Association of Members of the American Society of Civil Engineers was organized on June 30th, 1913. At its meeting of January 25th, 1915, the following officers were elected for the ensuing year: President, R. H. Ober; Vice-President, A. S. Downey; and Secretary-Treasurer, Carl H. Reeves.

Southern California Association

The Southern California Association of Members of the American Society of Civil Engineers (Los Angeles, Cal.) holds regular bimonthly meetings, with banquet, on the second Wednesday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained from the Secretary of the Association, W. K. Barnard, 515 Central Building, Los Angeles, Cal.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in Los Angeles, and any such member will be gladly welcomed as a guest at any of the meetings or luncheons.

Spokane Association

At its meeting of March 4th, 1914, the Board of Direction considered and approved the proposed Constitution of the Spokane Association of Members of the American Society of Civil Engineers. Ulysses B. Hough is President.

Texas Association

At its meeting of December 31st, 1913, the Board of Direction considered and approved the proposed Constitution of the Texas Association of Members of the American Society of Civil Engineers. The headquarters of the Association is Dallas, Tex. John B. Hawley is President.

MINUTES OF MEETINGS OF SPECIAL COMMITTEES TO REPORT UPON ENGINEERING SUBJECTS

Special Committee on Stresses in Railroad Track

January 19th, 1915.—The meeting was held at the House of the Society. Present, A. N. Talbot (Chairman), William McNab, G. J. Ray, and J. E. Willoughby (of the Committee) and also W. M. Dawley

and P. H. Dudley (of the Committee of the American Railway Engineering Association).

The Chairman presented informally the results of the tests already made on the Illinois Central Railroad to determine the equilibrium depression curve of rail, tie, and roadbed, and strain in rail, and made an informal oral report of the results of the test work and of the instruments used and devised. The results of the tests were discussed by members of the Committee. Dr. Dudley presented, in printed form, the results of tests, on the New York Central Railroad, to find the stresses in rail with locomotive running at various speeds. A Report of Progress, for presentation to the Annual Meeting, was discussed and adopted. The Chairman was authorized to present a budget to the Board of Direction as a basis for an appropriation for the coming year.

Special Committee on Floods and Flood Prevention

January 19th, 1915.—The third meeting of the Committee was held at the House of the Society, at 2 P. M. Present, C. McD. Townsend (Chairman), John A. Bensel, and John A. Ockerson. The draft of a report was read and discussed, and it was finally decided that, with such a limited number of members of the Committee present, it was advisable merely to report progress at the Annual Meeting of the Society.

Special Committee on Materials for Road Construction

January 21st, 1915.—The meeting was held at the House of the Society. Present, W. W. Crosby (Chairman), H. K. Bishop, A. W. Dean, Nelson P. Lewis, Charles J. Tilden, and A. H. Blanchard (Secretary).

A communication from the Secretary of the Society, dated December 7th, 1914, in reference to the granting by the Board of Direction of the appropriation of $48.38 for laboratory research work, was read.

The Regulations in reference to Special Committees, adopted by the Board of Direction on January 6th, 1915, were discussed.

The Chairman outlined the work of 1915 in reference to non-bituminous road materials, and announced the continuance of the same sub-committees as appointed in 1914.

The Chairman requested that lists of foreign non-members of the Society, to whom the 1915 Report should be forwarded with a view to soliciting discussion, should be sent to the Secretary on or before February 1st, 1915.

PRIVILEGES OF ENGINEERING SOCIETIES EXTENDED TO MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms, and at all meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street, New York City.

American Society of Mechanical Engineers, 29 West Thirty-ninth Street, New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66, Germany.

Associação dos Engenheiros Civis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria, Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston, Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West, Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, Chamber of Commerce Building, Cleveland, Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniorforening, Amaliegade 38, Copenhagen, Denmark.

Detroit Engineering Society, 46 Grand River Avenue, West, Detroit, Mich.

Engineers and Architects Club of Louisville, 1412 Starks Building, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

Engineers' Club of Minneapolis, 17 South Sixth Street, Minneapolis, Minn.

Engineers' Club of Philadelphia, 1317 Spruce Street, Philadelphia, Pa.

Engineers' Club of St. Louis, 3817 Olive Street, St. Louis, Mo.

Engineers' Club of Toronto, 96 King Street, West, Toronto, Ont., Canada.

Engineers' Society of Northeastern Pennsylvania, 415 Washington Avenue, Scranton, Pa.

Engineers' Society of Pennsylvania, 31 South Front Street, Harrisburg, Pa.

Engineers' Society of Western Pennsylvania, 2511 Oliver Building, Pittsburgh, Pa.

Institute of Marine Engineers, 58 Romford Road, Stratford, London, E., England.

Institution of Engineers of the River Plate, Calle 25 de Mayo 195, Buenos Aires, Argentine Republic.

Institution of Naval Architects, 5 Adelphi Terrace, London, W. C., England.

Junior Institution of Engineers, 39 Victoria Street, Westminster, S. W., London, England.

Koninklijk Instituut van Ingenieurs, The Hague, The Netherlands.

Louisiana Engineering Society, State Museum Building, Chartres and St. Ann Streets, New Orleans, La.

Memphis Engineering Society, Memphis, Tenn.

Midland Institute of Mining, Civil and Mechanical Engineers, Sheffield, England.

Montana Society of Engineers, Butte, Mont.

North of England Institute of Mining and Mechanical Engineers, Newcastle-upon-Tyne, England.

Oesterreichischer Ingenieur- und Architekten-Verein, Eschenbachgasse 9, Vienna, Austria.

Oregon Society of Civil Engineers, Portland, Ore.

Pacific Northwest Society of Engineers, 312 Central Building, Seattle, Wash.

Rochester Engineering Society, Rochester, N. Y.

Sachsischer Ingenieur- und Architekten-Verein, Dresden, Germany.

Sociedad Colombiana de Ingenieros, Bogota, Colombia.

Sociedad de Ingenieros del Peru, Lima, Peru.

Societe des Ingenieurs Civils de France, 19 rue Blanche, Paris, France.

Society of Engineers, 17 Victoria Street, Westminster, S. W., London, England.

Svenska Teknologforeningen, Brunkebergstorg 18, Stockholm, Sweden.

Tekniske Forening, Vestre Boulevard 18–1, Copenhagen, Denmark.

Western Society of Engineers, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From February 2d to March 1st, 1915)

DONATIONS*

PRACTICAL IRRIGATION AND PUMPING:

Water Requirements, Methods of Irrigation, and Analyses of Cost and Profit. By Burton P. Fleming, Assoc. M. Am. Soc. C. E. Cloth, 8¼ x 5½ in., illus., 16 + 226 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1915. $2.00.

The solution of the irrigation problem of the vast uncultivated areas in the West, lying on the higher benches or mesas adjacent to irrigated valleys and above high-line canals, lies, the author states, in the pumping of surface or subsurface water supplies. In this volume, therefore, he presents the subject of irrigation chiefly from the pumping standpoint, discussing in detail the design, operation, installation, and cost of a small pumping plant for such purpose, which he hopes will be helpful to the contractor who specializes in pumping machinery and the engineer who is called on to design the central station plant. The author, it is stated, has had more than eight years' experience in irrigation work covering most of the Western States, which experience he has embodied in this volume. The Chapter headings are: The Amount of Water Required; Sources of Supply; The Flow of Underground Water; Strainers; Well Sinking; Pumps, Pumping Machinery, and Appliances; Centrifugal Pumps; Different Types of Installation for Centrifugal Pumps; Typical Plants Not Using Centrifugal Pump; Cost of Pumping; The Question of Cost and Profit on a Small Farm Irrigated by Pumped Water; Reservoirs; Prime Movers; The Central Station Pumping Plant; Windmills; Appendix: Partial List of Manufacturers and Dealers in Machinery and Appliances Used in Irrigation Pumping; Index.

AIR, WATER, AND FOOD

From a Sanitary Standpoint. By Alpheus G. Woodman and John F. Norton. Fourth Edition, Revised and Rewritten. Cloth, 9¼ x 6 in., illus., 5 + 248 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1914. $2.00.

The subject-matter of this book deals chiefly, it is stated, with the chemical analysis of air, water, and food, in their relations to the needs of daily existence, and to such portions of the chemistry of sanitation as come directly under individual control or which require the education of individuals in order to carry out sanitary measures. The preface states that since the last edition of the work was published, in 1909, distinct advances have been made in analytical methods and in the interpretation of results, all of which has necessitated, in this edition, the complete rewriting of the chapters on air and water as well as the section on milk, a revision of the older methods discussed, and numerous additions, in order to bring the contents up to the latest practice. A bibliography of the subjects discussed is included. The Chapter headings are: Three Essentials of Human Existence; Air and Health; Air: Analytical Methods; Water: Its Relation to Health, Its Source and Properties; Safe Water and the Interpretation of Analyses; Water: Analytical Methods; Food in Relation to Human Life, Definition, Sources, Classes, Dietaries; Adulteration and Sophistication of Food Materials; Analytical Methods; Appendix A, Tables; Appendix B, Reagents; Bibliography; Index.

DESIGNING CHART FOR STEEL OR WOOD BEAMS.

By Charles W. Schubert, Assoc. M. Am. Soc. C. E. Printed on Veneered Celluloid, 12 x 7¾ in. Cleveland, Ohio, The Author, 1914. $5.00.

This chart, the designer states, may be considered as a designer's handbook on one sheet, as it is intended to save time in handling problems of design ordinarily solved by reference to structural handbooks. The fundamental principle involved in solving formulas by use of this chart is to align two assumed variables and read the third on its proper axis. It is said to cover all the standard and Bethlehem sections of I-beams, channels, and angles, as well as the new Carnegie "supplementary" sections, and wood beams may also be designed by its use. The graduations on the chart show the allowed uniform load and load per linear foot for any

* Unless otherwise specified, books in this list have been donated by the publishers.

span, spacing for any load per square foot of floor, maximum bending moments, section moduli for steel shapes, and moment of resistance of wood beams for any fiber stress.

A MODEL FIRE-PROOF FARM HOUSE OR COUNTRY HOME:

Practical Suggestions for Economical and Enduring Construction with Complete Plans and Specifications of a Model Building. By A. L. A. Himmelwright, M. Am. Soc. C. E. Paper, 9¼ x 11¾ in., illus., 91 pp. New York, The Neale Publishing Company, 1913. $1.00. (Donated by the Author.)

The object of this volume, as stated by the author, is to present full, practical, and correct information on every phase of building an inexpensive fireproof country home without the aid of an architect. The subject-matter is said to be wholly original and based on the author's long experience in the construction of buildings. It includes general and detailed plans and complete specifications, a practical treatment of such important subjects as location, drainage, local water supply, pipe sizes, etc., together with quantities, complete and accurate costs, and other data based on the actual costs of a model building constructed in 1909, of which careful record was kept. The Contents are: Location, Water Supply, Drainage, Excavating and Grading; The Plans; Practical Suggestions; A Model Sixteen-Room Building; Specifications; Schedule of Material; A Model Ten-Room Building; Appendix: A Partial List of Names and Addresses of Reliable Concerns Equipped to Furnish Materials for These Model Buildings.

UNIVERSAL SAFETY STANDARDS, MACHINE SHOP AND FOUNDRY:

A Reference Book of Rules, Drawings, Tables, Formulas, Data, and Suggestions for Use of Architects, Engineers, Superintendents, Foremen, Inspectors, Mechanics and Students. By Carl M. Hansen. Second Edition, Revised and Enlarged. Leather, 7¾ x 5¼ in., illus., 312 pp. New York, Philadelphia, London, Universal Safety Standards Publishing Company, 1914. $3.00.

In the first edition of this volume, published in November, 1913, the question of safety standards was treated, it is stated, in a general manner. In the present volume, which is the first of a series of books on the subject to be issued under the direction of the Workmen's Compensation Service Bureau, the subject is treated from the standpoint of safety in machine shops and foundries. The author's aim has been to present, for ready reference, and in detail from the construction of the plant through the shipping room, conditions ordinarily found in machine shops and foundries, with the proper safeguards applied, and to illustrate each description with drawings which show clearly the application of the principles of such safeguarding. Attention is especially called by the author to the treatment of stairways, steam engine guarding, and grinding wheel protection. The Contents are: Part I, General Safety Standard; Part II, Machine Shop; Part III, Foundry; Part IV, Rules for Practice: Machine Shops, Metal Shops and Foundry; Index.

GRAPHIC METHODS FOR PRESENTING FACTS.

By Willard C. Brinton. (Works Management Library.) Cloth, 10¼ x 7¼ in., illus., 12 + 371 pp. New York, The Engineering Magazine Company, 1914. $4.00.

The author states that the proper kind of a chart is infinitely better than a column of figures in making comparisons of various items of business, and, therefore, an effort has been made to produce, in this volume, a work which will serve as a handbook for any one who may have to prepare charts for reports, for magazine illustration, or for advertising. The subject, it is stated, is presented from the point of view of the business man, technical terms and mathematics being omitted as much as possible, but it is hoped that the book may prove useful to the engineer, the biologist, and the statistician. Although the text contains much detailed information concerning the methods of charting, the contents have been arranged, the author states, so that the busy reader may get the gist of the contents from the illustrations and the titles and sub-titles. The Contents are: Component Parts; Simple Comparisons; Simple Comparisons Involving Time; Time Charts; Curve Plotting; Comparison of Curves; Component Parts Shown by Curves; Cumulative or Mass Curves; Frequency Curves, Correlation; Map Presentations; Maps and Pins; Curves for the Executive; Records for the Executive; Corporation Financial Reports; General Methods; A Few Cautions; Index.

ELEMENTS OF HYDRAULICS.

By S. E. Slocum. Cloth, 9¼ x 6¼ in., illus., 11 + 294 pp. New York and London, McGraw-Hill Book Company, Inc., 1915. $2.50.

This book, it is stated, is intended as a modern presentation of the fundamental principles of hydraulics with application to such recent important works as the Catskill Aqueduct, the New York State Barge Canal, and the power plants at Niagara Falls and Keokuk. The design of turbines is not included, it is said, but the recent works of Zowski and Baashuus are presented in such a manner that the young engineer is enabled to make an intelligent choice of the type of development and selection of runner. At the end of each section, the author has included a collection of typical modern problems in hydraulics, and he has also compiled and tabulated many useful hydraulic data which are given at the end of the book. The Contents are: Section I, Hydrostatics; Section II, Hydrokinetics; Section III, Hydrodynamics; Section IV, Hydraulic Data and Tables; Index.

PROCEEDINGS OF THE SIXTH NATIONAL CONFERENCE ON CITY PLANNING.

Toronto, May 25-27, 1914. Cloth, 9½ x 6½ in., illus., 361 pp. Cambridge, Mass., The University Press, 1914. $2.00. (Donated by the National Conference on City Planning.)

This volume contains the Proceedings of the first meeting of the National Conference on City Planning held in Canada. At this meeting, which was officially recognized by the Canadian Government, the various Provinces, and the City of Toronto, the work of city planning and of municipal administration was discussed by officials and engineers, making possible the exchange of experiences in the handling of various municipal problems such as water fronts, city financing, housing, rapid transit, etc., all of which have been compiled and are presented in this book. An exhibition of Canadian town planning was also shown by the Commission of Conservation. The Contents are: Remarks at the Opening of the Conference; Basic Principles of Water Front Development, by Robert Gourlay; Certain Aspects of City Financing and City Planning, by Andrew Wright Crawford; Progress of the Year in City Planning, by Flavel Shurtleff; Protecting Residential Districts, by Lawrence Veiller; A Town Planning Act for Canada, by J. H. Burland; Canada and the United States as a Field for the Garden City Movement, by G. Trafford Hewitt; Provision for Future Rapid Transit, by J. V. Davies; Utility of the Motor Bus and Municipal Problems Pertaining to Its Operation, by J. A. McCollum; The New York Rapid Transit Problem, by George McAneny; Size and Distribution of Playgrounds and Similar Recreation Facilities in American Cities, by Henry V. Hubbard; Remarks at the Closing Dinner; Conference Business; Appendix: Extracts from City Charter of Halifax, Nova Scotia.

STRUCTURAL STEEL DRAFTING AND ELEMENTARY DESIGN.

By Charles D. Conklin, Jr., Assoc. M. Am. Soc. C. E. Cloth, 9¼ x 12 in., 7 + 154 pp. New York, John Wiley & Sons, Inc.; London, Chapman & Hall, Limited, 1915.

This book, the preface states, deals with the preparation of shop detail drawings of structural steelwork, and is presented for use as a guide in the technical school drafting-room. No claim is made that all information relating to shop detail drawings is given, but sufficient examples and instructions are included to familiarize the beginner with drawing-room practice of the best and largest structural steel firms and to give him a knowledge of the methods used in detailing. The author has worked out a number of typical simple designs and has had shop drawings for the same prepared, thereby presenting to the student the entire work of the structural steel drafting-room, including the engineering department. The Contents are: Drafting-Room; Estimating and Designing; Equipment, Lettering, Assembling Marks; Ordering Material: Detailing Elementary Shapes; Rivets and Riveted Connections; Beam and Column Detailing; Wall Girder and Columns—Design and Detail; Design and Detail of Steel Roof; Design and Detail of Deck Plate Girder Railway Bridge; Shop Detail of Through Girder Bridge; Design and Detail of Country Highway Bridge; Design of Through Riveted Railway Span; Detail Drawings for Through Railway Bridges; Hip and Valley Details; Appendix: General Specifications for Steel Railway Bridges; Index.

CITY OFFICIALS OF THE UNITED STATES

Comprising all Cities and Towns Having More Than 8 000 Inhabitants, Revised February 1st, 1915. Paper, 6 x 3¼ in., 39 pp. New York, Engineering News, 1915.

The subject-matter of this little volume is arranged alphabetically by cities and includes the name of the Mayor or Chief Executive of each town, the names

of the City Clerk, City Engineer, and of the Superintendent or official in charge of the water supply. The form of government of each town is also given, whether commission government, city manager plan, etc., as well as the population according to the United States Census of 1910.

STRUCTURAL ENGINEERING.

By J. E. Kirkham, Assoc. M. Am. Soc. C. E. Cloth, 9¼ x 6¼ in., illus., 4 + 669 pp. Chicago, The Myron C. Clark Publishing Co.; London, E. & F. N. Spon, Ltd., 1914. $5.00.

The preface states that this book is intended as a textbook for college students and as a manual of structural engineering for practical men. The subject-matter treats of simple structures only, the author, it is stated, having in preparation a second volume which will treat of "Higher Structures", and relates to the determination of stresses, the selection of material, the drawing of details, the design of foundations, concrete floors, roofs, etc. The designs included in the text are stated to be entirely the work of the author and made especially for this book, the usual methods of designing being presented so that they may be read and understood without the use of a dictionary, glossary, or compendium of theoretical mechanics. The author, it is stated, has arranged the drawing-room exercises throughout the text in order that the work in the classroom and workroom will go hand in hand. The Contents are: Preliminary; Structural Draughting; Fundamental Elements of Structural Mechanics; Theoretical Treatment of Beams; Theoretical Treatment of Columns; Rivets, Pins, Rollers and Shafting; Maximum Reactions, Shears, and Bending Moments on Beams and Trusses and Stresses in Trusses; Graphic Statics; Influence Lines; Design of I-Beams and Plate Girders; Design of Simple Railroad Bridges; Design of Simple Highway Bridges; Skew Bridges, Bridges on Curve, Economic Height and Length of Trusses and Stresses in Portals; Design of Buildings; Index.

Gifts have also been received from the following:

Alabama-Geol. Survey. 1 pam.
Alabama-State Highway Dept. 1 map.
Alabama Industrial and Scientific Soc. 1 bound vol.
Aldershot Gas, Water & Dist. Lighting Co. 1 pam.
Alexandra (Newport and South Wales) Docks & Ry. Co. 1 pam.
Am. Electrochemical Soc. 1 vol.
Am. Inst. of Archts. 5 pam.
Am. Inst. of Elec. Engrs. 1 bound vol.
Am. Mathematical Soc. 1 pam.
Am. Telephone & Telegraph Co. 3 pam.
Am. Vanadium Co. 1 pam.
Ann Arbor R. R. Co. 2 pam.
Armour Inst. of Tech. 5 vol.
Atlantic Coast Line R. R. Co. 8 pam.
Australia-Bureau of Census and Statistics. 1 bound vol.
Baltimore Assoc. of Members of the Am. Soc. of Civ. Engrs. 1 pam.
Brazil Ry. Co. 2 pam.
Buffalo & Susquehanna Ry. Co. 2 pam.
Bureau of Ry. Economics. 5 pam.
California-R. R. Comm. 1 bound vol.
California-State Board of Equalization. 1 pam.
Cambridge Univ. & Town Water-Works Co. 1 pam.
Canada-Dept. of Marine and Fisheries. 1 vol.
Canada-Dept. of Mines. 2 vol., 1 pam.
Canada-Dept. of the Interior. 3 vol., 1 map.
Canada-Geol. Survey. 1 vol., 1 pam.
Canada-Supt. of Irrig. 2 vol.
Canadian Min. Inst. 1 vol.
Canadian Pacific Ry. Co. 2 pam.
Carnegie Institution of Washington. 1 vol.
Case School of Applied Science. 1 vol.
Central R. R. Co. of New Jersey. 2 pam.
Charleston & Western Carolina Ry. Co. 5 pam.
Chesapeake & Ohio Ry. Co. 1 pam.
Chicago, Ill.-Harbor and Subway Comm. 3 vol., 3 pam.
Chicago Great Western R. R. Co. 2 pam.
Chicago, Milwaukee & Puget Sound Ry. Co. 2 pam.
Cincinnati, Hamilton & Dayton Ry. Co. 1 pam.
Cleveland, Akron & Cincinnati Ry. Co. 1 pam.
Cleveland, Cincinnati, Chicago & St. Louis Ry. Co. 1 pam.
Cleveland Terminal & Val. R. R. Co. 7 pam.
Conference of Port Authorities of the Pacific Coast. 1 pam.
Connecticut-Shell-Fish Comm. 1 pam.
Connecticut-State Geol. and Natural History Survey. 1 pam.
Corthell, Elmer L. 1 pam.
Cripple Creek Central Ry. Co. 1 pam.
Danvers, Mass.-Supt. of Water Dept. 1 pam.
Davidson, L. H. 1 bound vol.
Detroit, Mich.-Board of Health. 7 pam.
Detroit & Mackinac Ry. Co. 2 pam.
Dooling, Peter J. 1 pam.
Drinker, H. S. 5 pam.
Elec. Bond & Share Co. 1 pam.
Engrs. Club of Dayton. 1 pam.
Essex County, Mass.-County Engr. 1 pam.
Fitchburg R. R. Co. 13 pam.
Fonda, Johnstown & Gloversville R. R. Co. 2 pam.
Ford, Bacon & Davis. 1 pam.
Georgia R. R. & Banking Co. 6 pam.
Georgia Southern & Florida Ry. Co. 4 pam.
Grand Trunk Ry. Co. of Canada. 13 pam.
Great Central Ry. Co. 1 pam.
Great Eastern Ry. Co. 1 pam.

Great Northern Ry. Co. (Ireland). 1 pam.
Harder, H. J. 1 pam.
Hatt, W. K. 1 pam.
Hawaii-Public Utilities Comm. 1 pam.
Highland Ry. Co. 1 pam.
Hull & Barnsley Ry. Co. 1 pam.
Illinois-Rivers and Lakes Comm. 1 bound vol.
Illinois-State Highway Dept. 9 pam.
Illinois Coal Min. Investigations. 1 pam.
Institution of Civ. Engrs. 1 bound vol.
Institution of Gas Engrs. 1 bound vol.
Iowa-Geol. Survey. 1 bound vol.
Iowa, Univ. of. 1 pam.
Iron and Steel Inst. 1 bound vol.
Iron Canyon Project Assoc. 1 vol.
Islington (London), England-Town Clerk. 1 bound vol.
Japan-Imperial Govt. Rys. 1 vol.
Johnstown, N. Y.-Board of Water Commrs. 1 pam.
Junior Inst. of Engrs. 1 bound vol.
Kansas-Tax Comm. 1 pam.
Kansas, Univ. of.-Eng. Exper. Station. 1 pam.
Lehigh Coal & Navigation Co. 1 pam.
Liverpool Overhead Ry. Co. 1 pam.
London Elec. Ry. Co. 1 pam.
Los Angeles, Cal.-Board of Public Utilities. 1 pam.
Louisiana-Superv. of Public Accounts. 2 pam.
McCarty, R. J. 1 vol.
Madras, India-Public Works Dept. 1 vol.
Maine-Forest Commr. 1 bound vol.
Maryport & Carlisle Ry. Co. 1 pam.
Massachusetts-Bureau of Statistics. 1 pam.
Mass. Inst. of Tech. 1 pam.
Mather, Stephen T. 1 pam.
Meriden, Conn.-City Clerk. 2 pam.
Michigan-Board of Tax Commrs. 1 pam.
Michigan-R. R. Comm. 1 bound vol.
Michigan Agri. Coll. 2 pam.
Midland Ry. Co. 1 pam.
Missouri-Agri. Exper. Station. 1 pam.
Missouri-State Board of Health. 2 bound vol.
Mobile, Ala.-Board of Commrs. 1 pam.
Montana-Grain Inspection Dept. 1 pam.
Montana-Highway Comm. 4 pam.
Montana-R. R. Comm. 1 bound vol.
Moore, J. Hampton. 1 pam.
National Academy of Sciences. 1 pam.
National Assembly of Civ. Service Commissions. 1 bound vol., 1 pam.
New Hampshire-State Highway Dept. 1 map.
New Hampshire-Secy. of State. 1 pam.
New Orleans, La.-Board of Commrs. of the Port of New Orleans. 1 pam.
New York City-Dept. of Health. 1 pam.
New York State-Comm. to Investigate Port Conditions and Pier Extensions in New York Harbor. 1 vol.
New York State-Monuments Comm. 2 pam.
New York State-Public Service Comm., Second Dist. 2 bound vol., 3 pam., 2 maps.
New York-Secy. of State. 1 pam.
New York-State Architect. 2 pam.
New York Bureau of Municipal Research. 2 pam.
New York Chamber of Commerce. 1 pam.
Newburgh, N. Y.-Board of Water Commrs. 1 pam.
North British Ry. Co. 1 pam.
North Dakota-Board of R. R. Commrs. 3 pam.
North Staffordshire Ry. Co. 1 pam.
Ohio-Public Utilities Comm. 4 pam.
Oklahoma-Geol. Survey. 4 pam.
Oregon-State Board of Forestry. 1 pam.
Pacific Northwest Soc. of Engrs. 1 pam.
Paterson, N. J.-City Clerk. 1 pam.
Pennsylvania-Dept. of Forestry. 3 bound vol., 18 pam.
Pennsylvania-Legislative Reference Bureau. 1 vol.
Pennsylvania-Public Service Comm. 5 pam.
Pennsylvania-State Highway Dept. 1 bound vol., 1 pam.
Perrine, Harold. 1 pam.
Philippine Islands-Bureau of Civ. Service. 1 pam.
Philippine Islands-Bureau of Forestry. 1 pam.
Rhode Island-Commrs. of Shell Fisheries. 1 pam.
Rhymney Ry. Co. 1 pam.
St. Louis, Mo.-Commr. of Public Bldgs. 1 pam.
Salford, England-Town Clerk. 1 bound vol.
San Francisco Assoc. of Members of the Am. Soc. of Civ. Engrs. 2 pam.
Schenectady, N. Y.-Bureau of Water. 1 pam.
Seattle, Wash.-Supt. of Bldgs. 1 pam.
Sioux City, Iowa-City Clerk. 2 pam.
Smith, Willard A. 1 pam.
Sociedad Cubana de Ingenieros. 1 pam.
South Dakota-State Engr. 1 bound vol.
South Eastern & Chatham Ry. Co. 1 pam.
South Eastern Ry. Co. 1 pam.
Syracuse, N. Y.-City Clerk. 1 vol., 1 pam.
Tennessee-R. R. Comm. 1 vol.
Texas Assoc. of Members of the Am. Soc. of Civ. Engrs. 1 pam.
Toledo, Ohio-Clerk of Council. 1 pam.
Truro, N. S.-Mayor. 1 pam.
U. S.-Bureau of Standards. 4 pam.
U. S.-Bureau of the Census. 1 bound vol., 1 pam.
U. S.-Chf. of Engrs. 17 specif.
U. S.-Geol. Survey. 7 vol., 13 pam.
U. S.-Interstate Commerce Comm. 1 pam.
U. S.-National Museum. 1 vol.
U. S.-Ordnance Dept. 1 pam.
U. S.-Reclamation Service. 1 pam.
Univ. of the Philippines. 1 vol.
Utah Soc. of Engrs. 1 pam.
Vermont-Dept. of Weights and Measures. 7 pam.
Vermont-Free Public Library Comm. 1 map.
Vermont-State Board of Health. 1 bound vol.
Vermont-State Highway Commr. 1 pam.
Ward, C. D. 2 vol.
Washington-State Board of Tax Commrs. 1 vol.
Washington, Univ. of. 1 pam.
West Virginia-Dept. of Mines. 1 bound vol.
Winchester, Mass.-Town Clerk. 1 vol.
Wisconsin-Industrial Comm. 1 pam.
Wisconsin-R. R. Comm. 1 bound vol.

BY PURCHASE

Graphical Determination of Sags and Stresses for Overhead Line Construction. By Guido and Marco Semenza. Translated from the Italian by C. O. Mailloux. New York and London, 1915.

The Cementation of Iron and Steel. By Federico Giolitti. Translated from the Italian by Joseph W. Richards and Chas. A. Rouiller. New York and London, 1915.

Principles of Electrical Measurements. By Arthur Whitmore Smith. New York and London, 1914.

The Science of Accounts: A Presentation of the Underlying Principles of Modern Accounting, Designed as a Work of Reference for Accountants, and as a Text Book for Advanced Students of Accountancy. By Harry C. Bentley. New York, 1913.

Practical Cold Storage: The Theory, Design and Construction of Buildings and Apparatus for the Preservation of Perishable Products. By Madison Cooper. Second Edition. Chicago, 1914.

Elementary Mathematical Analysis: A Text Book for First-Year College Students. By Charles S. Slichter. New York and London, 1914.

Coal Gas Residuals. By Frederick H. Wagner. New York and London, 1914.

Keister's Corporation Accounting and Auditing: A Practical Treatise on Higher Accounting. By D. A. Keister. With an Introduction by Henry C. White. Fourteenth Edition. Cleveland, 1912.

Handbook of Tables and Formulas for Engineers. Compiled by Clarence A. Peirce. With Mathematical Sections by Walter B. Carver. New York and London, 1914.

The American Year Book: A Record of Events and Progress 1914. Edited by Francis G. Wickware, with Co-operation of a Supervisory Board Representing National Learned Societies. New York and London, 1915.

SUMMARY OF ACCESSIONS

(From February 2d to March 1st, 1915)

Donations (including 22 duplicates)	386
By purchase	10
Total	396

MEMBERSHIP

(From February 5th to March 4th, 1915)

ADDITIONS

	Date of Membership.
HONORARY MEMBER	
DODGE, GRENVILLE MELLEN. Council Bluffs, Iowa	Mar. 2, 1915
MEMBERS	
PRIOR, JOSEPH HENRY. 508 Odd Fellows Bldg., Springfield, Ill	Sept. 2, 1914
SPENCER, CHARLES HENRY. 6808 Sixth St., Takoma Park, D. C.	Sept. 2, 1914
ASSOCIATE MEMBERS	
ALDEN, LANGFORD TAYLOR. Designer, State Board of Harbor Commrs., 639 Mason St., San Francisco, Cal.	Sept. 2, 1914
ALLNER, FREDERICK ABELS. Gen. Supt., Pennsylvania Water & Power Co., 40 U. S. Fidelity & Guarantee Bldg., Baltimore, Md	Dec. 2, 1914
BECKER, WILLIAM HATRICK. Care, Terminal Hotel, San Francisco, Cal	Jan. 6, 1915
CHALLIES, JOHN BOW. Supt., Dominion Water Power Branch, Dept. of the Interior, Ottawa, Ont., Canada.	Sept. 2, 1914
FEUSTEL, ROBERT MAXIMILIAN. Chf. Engr., State Public Utilities Comm. of Illinois; (Sloan, Huddle, Feustel & Freeman), Box 504, Madison, Wis	Nov. 4, 1914
GOULD, AUGUSTUS GEORGE. Vice-Pres. and Treas., The Gould Constr. Co., 740 Grand Court, Davenport, Iowa.	Oct. 7, 1914
HANNAH, MANTON. County Engr., Lamar County, P. O. Box 24, Paris, Tex.	Jun. Nov. 1, 1910 Assoc. M. Sept. 2, 1914
HAWKINS, NED ELMER. Cons. Engr. (Boothe & Hawkins), 1923 Elm St., Youngstown, Ohio	Dec. 2, 1914
HUNT, HORACE SINCLAIR. 207 West Morrell St., Jackson, Mich	Oct. 7, 1914
JAMES, FRANK TROWBRIDGE. Contr., Box 178, Manila, Philippine Islands	Nov. 4, 1914
SEE, GEORGE CORLISS. 388 Quail St., Albany, N. Y.	Jun. Sept. 3, 1907 Assoc. M. Sept. 2, 1914
SHERMAN, ARTHUR LOUIS. Asst. Engr., New York State Dept. of Highways, Elec. Light Bldg., Patchogue, N. Y.	Jun. Jan. 4, 1910 Assoc. M. Jan. 6, 1915
SMITH, LANDON GARLAND. Superv. Highway Engr., Lee County, Tupelo, Miss	Sept. 2, 1914
SMITH, LEROY CLARKE. Civ. Engr. Deputy, State Highway Dept., Lansing, Mich	Jan. 6, 1915
THORNTON, EDMUND ABIEL. Civ. Engr., Ray Consolidated Copper Co., Box 244, Ray, Ariz	Nov. 4, 1914
UNDERHILL, GEORGE GARDNER. Chf. Engr., Mexican Northern Power Co., Care, Cia. Agricola y de Fuerza Electrica del Rio Conchos, S. A., Ciudad Camargo, Chih., Mexico	Jan. 6, 1915

ASSOCIATE MEMBERS (*Continued*)

	Date of Membership.
VILLADSEN, ANDERS BAGGE. Engr. and Contr. (Villadsen Bros.), 304 Dooly Bldg., Salt Lake City, Utah	Jan. 6, 1915
WALKER, JOHN PALMER. Div. Engr., Gen. Land Office, Washington, D. C.	Jan. 6, 1915
WIGHOLM, CARL AUGUST. 632 Sixtieth St., Oakland, Cal.	Jan. 6, 1915
WOODHOUSE, SIDNEY JAMES. Engr. and Contr. (Leblanc & Woodhouse), Calle Marta Abreu No. 10, Santa Clara, Cuba	Oct. 7, 1914

JUNIORS

FINKBEINER, DANIEL TALBOT. 817 Westinghouse Bldg., Pittsburgh, Pa.	Dec. 2, 1914
SMITH, RICHARD BENNETT. Balboa Heights, Canal Zone, Panama	Jan. 6, 1915

CHANGES OF ADDRESS

MEMBERS

CAMERON, HARRY FRANK. Senior Supervising Engr., Bureau of Public Works, in Chg., Mindanao and Sulu, Zamboanga, Philippine Islands.

CHARNLEY, WALTER. Chf. Engr., The São Paulo Tramway, Light & Power Co., Ltd., and São Paulo Elec. Co., São Paulo, Brazil.

CLARKE, DAVID DEXTER. Engr., Water Bureau, City Hall, Portland, Ore.

COE, THOMAS HAMILTON. Care, O. D. Purington & Co., 625 Industrial Trust Co. Bldg., Providence, R. I.

COLE, WILLIAM WEEDIN. (Cole, Ives & Davidson), 61 Broadway, New York City.

CONNOR, SAMUEL POWERS. Asst. Mgr., Cramp & Co., 23 East 26th St., New York City.

COX, LEONARD MARTIN. Corps of Civ. Engrs., U. S. N.; Public Works Officer, Navy Yard, New York, N. Y.

CREW, CHARLES CORWIN. Cons. Engr., Box 1122, Houston, Tex.

EHLE, BOYD. 34 East Radford St., Yonkers, N. Y.

FORGIE, JAMES. 1075 Woolworth Bldg., New York City.

FRENCH, MANSFIELD JOSEPH. Ry. and Structural Engr., 701 Snow Bldg., Syracuse, N. Y.

GOODNOUGH, XANTHUS HENRY. Chf. Engr., State Dept. of Health, Room 141, State House, Boston, Mass.

GOULD, WILLIAM TILLOTSON. Chf. Engr., N-C-O Ry. and Sierra & Mohawk Ry., Reno, Nev.

GRAY, HENRY LILBURN. Cons. Engr., 841 Henry Bldg., Seattle, Wash.

HALL, LOUIS WELLS. Care, U. S. Reclamation Service, Washington, D. C.

HANCOCK, ROBERT RIVES. Vice-Pres. and Gen. Supt., The Philippine Ry., Iloilo, Philippine Islands.

HENDERSON, JOHN BAILLIE. "Monkira", Hawthorne, East Brisbane, Queensland, Australia.

MEMBERS (*Continued*)

HOLLYDAY, RICHARD CARMICHAEL. Civ. Engr., U. S. N., Navy Yard, Norfolk, Va.

HORROCKS, JOHN IRVIN. Tolt, Wash.

HUBBARD, ISAAC WENDELL. Civ. and San Engr. (Pugh & Hubbard), 731 Witherspoon Bldg., Philadelphia, Pa.

HUGHES, FRANCIS DEY. Designing Engr., Contr. Dept., Illinois Steel Bridge Co., Jacksonville, Ill.

KNICKERBOCKER, CURTIS EDWIN. Cost Engr., Div. of Valuation, Interstate Commerce Comm., Washington, D. C.

KWONG, KING YANG. Co-Director and Engr.-in-Chf., Chinese Govt. Rys., Peking-Kalgan Line, Kalgan, North China.

LANGE, GUNARDO ANFIN. General Alvear, F. C. al Pacifico, Mendoza, Argentine Republic.

LEAVENWORTH, GEORGE STEVENS. Cons. Engr., 1016 Milledge Rd., Augusta, Ga.

LEWIS, CLARENCE CHARLES. Gen. Mgr., Cia. de Luz y Fuerza, Cordoba, Argentine Republic.

MACKSEY, HENRY VINCENT. Supt. of Public Works, Municipal Bldg., Woburn, Mass.

MCKIM, JAMES ARTHUR. Care, General Delivery, San Diego, Cal.

MARTIN, JAMES WILLIAM. Contr. Engr., 28 Ocean Pl., Long Beach, Cal.

PATSTONE, LEWIS FREDERICK. Civ. Engr. and Contr., Manila, Philippine Islands.

PIERCE-HOPE, JOHN. Caixa No. 53, Corumba, *via* Rio de Janeiro, Brazil.

PUGH, MARSHALL ROGERS. Civ. and San. Engr. (Pugh & Hubbard), 731 Witherspoon Bldg., Philadelphia, Pa.

REABURN, DE WITT LEE. Civ. and Hydr. Engr., 1631 West 9th St., Los Angeles, Cal.

REED, MELVILLE EMERSON. Cons. Engr., Daytona Beach, Fla.

SCAMMELL, JOHN KIMBALL. Dist. Engr., Public Works, Canada, Box 554, Fredericton, N. B., Canada.

SHIPLEY, HENRY FRANKLIN. Prin. Asst. Engr. in Chg. of Highway Div., Eng. Dept., City of Cincinnati, 44 South Warwick Bldg., Cincinnati, Ohio.

SIMPSON, GEORGE FREDERIC. Designing Engr., Public Service Comm., First Dist., 519 West 143d St., New York City.

SLOCUM, HARRY SPENCER. Engr. in Chg., Columbia Mills, Inc., Minetto, N. Y.

SPRING, *Sir* FRANCIS JOSEPH EDWARD. Chairman, Madras Port Trust Board; Chf. Engr., Madras Port Trust; Cons. Engr., Chittagong Port, Madras, India.

TEICHMAN, FRANK. Engr., U. S. Reclamation Service, Washington, D. C.

TENNEY, WILLIS ROBINSON. 50 Court St., Brooklyn, N. Y.

VANDEVANTER, CHARLES OSCAR. Leesburg, Va.

VENT, FREDERICK GOODMAN. Care, C. M. & St. P. Ry., Fullerton Ave. Office, Chicago, Ill.

MEMBERS (*Continued*)

VON PIONTKOWSKI, EDGAR STANISLAUS. Chf., M. of W. and New Works, Manila R. R., P. O. Box 448, Manila, Philippine Islands.

WAGNER, SAMUEL TOBIAS. Asst. Engr., P. & R. Ry., Spring Garden Station, Philadelphia, Pa.

WAUTERS, CARLOS. Prof., National Univ. of Buenos Aires; Civ. and Const. Engr., Charcas 1983, Buenos Aires, Argentine Republic.

WEEDIN, KIRBY CALHOUN. Const. Supt., The J. G. White Eng. Corporation, 909 Clayton St., San Francisco, Cal.

WEIDMAN, WILLIAM ROE. 12226 Clifton Boulevard, Lakewood, Cleveland, Ohio.

ASSOCIATE MEMBERS

BAKER, HENRY ERSKINE. Hangchow, Chekiang, China.

BALDWIN, GEORGE HERBERT. 1801 Rose St., Berkeley, Cal.

BARNES, FRANK WILLIAM, JR. Care, J. G. White Eng. Corporation, Portland Point, N. Y.

BLACK, ROGER DERBY. Capt., Corps of Engrs., U. S. A., Manila, Philippine Islands.

BROWN, LEVANT R. Dist. Engr., Bureau of Public Works, Pasig, Rizal, Philippine Islands.

BROWN, ROBERT KING. Div. Engr., M. of W., S. P. L. A. & S. L. R. R., Room 228, Union Station, Salt Lake City, Utah.

COLLINS, GEORGE JAMES SCHILLING. Omaha National Bank Bldg., Omaha, Nebr.

CORY, WILLIAM EARLE. Sedalia, Mo.

CRAIG, JOSEPH EDWIN. Asst. Engr. of Port Comm. of Jacksonville, Realty Bldg. (Res., 1623 Boulevard), Jacksonville, Fla.

CRYDER, HOWARD MICHAEL. Engr. and Contr. (Carmichael Cryder Co.), International Life Bldg., St. Louis, Mo.

DECKER, FRANK WARWICK. Office Engr., The Manila Ry., Ltd., Manila, Philippine Islands.

FISHER, FREDERICK WILLIAM. Field and Safety Engr., Rochester Ry. & Light Co., 34 Clinton Ave., N., Rochester, N. Y.

FRY, HOWELL LEWIS. Engr. and Contr. (Fry & Munson), Caixa Postal 1100, São Paulo, Brazil.

GREEN, THEODORE. Vice-Pres., Hydro Constr. Co., 1010 Mutual Life Bldg., Buffalo, N. Y.

GROSS, JOSEPH WATSON. Office Engr., California Highway Comm., Sacramento, Cal.

HAMMEL, VICTOR FRANK. With Elec. Bond & Share Co., 71 Broadway, New York City.

HESLOP, DERWENT GORDON. Asst. Constr. Engr., Ceylon Govt. Rys., Ragama, Ceylon.

HOLBROOK, WINFIELD. Engr., The Garden City Sugar & Land Co., Garden City, Kans.

HOWES, CYRUS PIERCE. Care, E. W. Wiggin, 506 Cutler Bldg., New Haven, Conn.

ASSOCIATE MEMBERS (*Continued*)

KATIGBAK, JOSÉ PETRONIO. First Asst. City Engr., Manila, Philippine Islands.

LEE, CHARLES AVERY. Care, British Columbia Elec. Ry., Vancouver, B. C., Canada.

LEONARD, OLIVER YEATON. 606 High St., Pottstown, Pa.

LEWIS, WASHINGTON BART. Care, U. S. Geological Survey, Washington, D. C.

MCCLAVE, STEPHEN WOOD, JR. Care, McClave & McClave, 1 Madison Ave., New York City (Res., Cliffside Park, N. J.).

MCRAE, HENRY CLINTON. Dime Savings Bank Bldg., Detroit, Mich.

MADDOCK, THOMAS. Engr., Saginaw Manistee Lumber Co.; Engr. and Contr., 323 North 2d St., Phœnix, Ariz.

MAHON, JOHN MONTGOMERY, JR. Asst. Engr., Pennsylvania Dept. of Health, 230 Woodbine St., Harrisburg, Pa.

MILLER, HENRY LANARK. Asst. Engr., Dept. of Roads and Bridges, Mendoza, Argentine Republic.

MILLER, WILLARD PRESTON. Clearfield, Pa.

MORRISON, CHRISTOPHER GEORGE. Dist. Engr., Bureau of Public Works, Lingayen, Pangasinan, Philippine Islands.

OKES, DAY IRA. 2436 First Ave., South, Minneapolis, Minn.

PALMER, WALLACE CROMWELL ALLEN. Asst. Engr., Bureau of Public Works, Manila, Philippine Islands.

RAIDER, HARRY ADAM. Div. Engr., American Section, Szechuen-Hankow Ry., Ichang, Hupeh, China.

REQUARDT, GUSTAV JAEGER. Acting Div. Engr., Baltimore Sewerage Comm., 2235 Eutaw Pl., Baltimore, Md.

REYNOLDS, LAFAYETTE CLOWE. Asst. to Vice-Pres., General Vehicle Co., Inc., Long Island City (Res., 73 Lakeside Drive, Rockville Center), N. Y.

RUSSELL, CLAUD. Dist. Engr., Bureau of Public Works, Philippine Islands, Cebu, Cebu, Philippine Islands.

SCUDDER, SAMUEL OSBORNE. Chf. Surv., Bureau of Lands, Manila, Philippine Islands.

SKINNER, BENJAMIN BAKER. 4404 Sixth Ave., Brooklyn, N. Y.

STOBO, JOHN BRUCE. Asst. Engr., New York State Barge Canal, 1009 Harrison St., Syracuse, N. Y.

SUDRIERS, VICTOR BOUREAU. Contr. Engr., Agraciada 2780, Montevideo, Uruguay.

TAYLOR, WILLIAM PURVES. 7425 Boyer St., Mt. Airy, Philadelphia, Pa.

TEFFT, WILLIAM WOLCOTT. Civ. and Hydr. Engr., 1003 West Main St., Jackson, Mich.

THOMPSON, EDWARD PERCIVAL. Gen. Mgr. and Chf. Engr., Visayan Refining Co., Cebu, Cebu, Philippine Islands.

TORNQUIST, CHARLES HERMAN. 803 East Kiowa St., Colorado Springs, Colo.

TOWLE, FOSTER. Asst. Engr., U. S. Reclamation Service, Fort Shaw, Mont.

ASSOCIATE MEMBERS (*Continued*)

WEEKS, GAYLORD D. Chf. Engr., Jarrett-Richardson Paving Co., 415 Holland Bldg., Springfield, Mo.

WHITE, LAZARUS. Managing Engr., Smith, Hauser & MacIsaac, Inc., 18 East 41st St., New York City.

WILLIAMS, JACOB PAUL JONES. Associate Editor, *Engineering Record*, 239 West 39th St., New York City.

WRIGHT, OTIS HORD. Anaconda, Mont.

JUNIORS

BAKER, NED DUNCAN. Prof. of Structural Eng., Pei Yang Univ., Tientsin, China.

BRAINERD, HAROLD AFFLECK. Engr., Am. Bridge Co., 30 Church St., New York City (Res., 618 Maple St., Westfield, N. J.).

BUCK, ROSS JUDSON. Civ. Engr. with O'Leary & Burns, Gen. Contrs., Iloilo, Philippine Islands.

CHAMBERLAIN, JOSEPH JENKS, JR. Designing Engr., E. F. Gibbons, 1900 Euclid Bldg., Cleveland, Ohio.

COOPER, CLARENCE WINSTON. 417 West 118th St., New York City.

DIMMLER, CHARLES LOUIS. Asst. Engr., Div. of Works, Panama-Pacific International Exposition, 1151 Masonic Ave., San Francisco, Cal.

EDGERTON, GLEN EDGAR. Capt., Corps of Engrs., U. S. A., Alaska Road Comm., Valdez, Alaska.

FORBES, FRANCIS BONNER. 8 West 56th St., New York City.

GEBHARDT, JOHAN FRIEDRICH WILHELM. Depto. Nacional de Fomento, Casilla Correo 334, Asuncion, Paraguay.

HIRAI, KIKUMATSU. Engr., Imperial Govt. Rys., Tomoge Hiratsukamura Ebaragori, Tokyo, Japan.

HOAR, ALLEN. Chf. Engr., L. A. Submarine Boat Co., 206 West 106th St., New York City.

HUNTSMAN, FRANK C. Div. Engr., C., B. & Q. R. R., Box 1397, Alliance, Nebr.

KELLY, JOHN ARTHUR. 900 South 10th St., Philadelphia, Pa.

MCCLURE, HUNTER. Care, Interstate Commerce Comm., 731 Wells Fargo Bldg., San Francisco, Cal.

MCENTIRE, LLOYD. Div. Highway Engr., New Jersey State Dept. of Public Roads, 244 North Warren St., Trenton, N. J.

MARKS, EDWIN HALL. First Lieut., Corps of Engrs., U. S. A., Manila, Philippine Islands.

MILLS, GUY G. Instr. in Structural Eng., Univ. of Illinois, Urbana, Ill.

MUNKELT, FREDERICK HERMANN. Care, Petroleum Iron Works Co., Sharon, Pa.

NAJJAR, SIMON ABRAHAM. Eng. Insp., Board of Water Supply, New York City, 438 DeGraw St., Brooklyn, N. Y.

SEGURA, VALERIANO. Dist. Engr., Bureau of Public Works, Province of Antique, San José de Buena Vista, Philippine Islands.

STARR, WILLIAM H. 804 East State St., Ithaca, N. Y.

JUNIORS (*Continued*)

STRANDBERG, GEORGE ROBERT. 1736 West 63d St., Seattle, Wash.

TAYLOR, SENECA VERN. Supt., Motor Trucks, United Fuel & Supply Co., 225 Marston Court, Detroit, Mich.

TUCKER, HENRY LEWIS. Bureau of Constr., Dept. of Public Works, 3519 Fifth Ave., Pittsburgh, Pa.

WILEY, HUGH LEMUEL. 402 Spalding Bldg., Portland, Ore.

FELLOWS

MEYER, HENRY CODDINGTON. 101 Park Ave., New York City.

REINSTATEMENT

MEMBER	Date of Reinstatement.
AERTSEN, GUILLIAEM	Feb. 5, 1915

DEATHS

FITTING, HAROLD HANSEN. Elected Junior, May 2d, 1911; Associate Member, September 3d, 1913; died January 7th, 1915.

MARVIN, FRANK OLIN. Elected Member, May 5th, 1897; died February 6th, 1915.

Total Membership of the Society, March 4th, 1915, 7 721.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(February 2d to March 1st, 1915)

NOTE.—*This list is published for the purpose of placing before the members of this Society, the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.*

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

(1) *Journal*, Assoc. Eng. Soc., St. Louis, Mo., 30c.
(2) *Proceedings*, Engrs. Club of Phila., Philadelphia, Pa.
(3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
(4) *Journal*, Western Soc. of Engrs., Chicago, Ill., 50c.
(5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
(6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
(7) *Gesundheits Ingenieur*, München, Germany.
(8) *Stevens Institute Indicator*, Hoboken, N. J., 50c.
(9) *Engineering Magazine*, New York City, 25c.
(11) *Engineering* (London), W. H. Wiley, 432 Fourth Ave., New York City, 25c.
(12) *The Engineer* (London), International News Co., New York City, 35c.
(13) *Engineering News*, New York City, 15c.
(14) *Engineering Record*, New York City, 10c.
(15) *Railway Age Gazette*, New York City, 15c.
(16) *Engineering and Mining Journal*, New York City, 15c.
(17) *Electric Railway Journal*, New York City, 10c.
(18) *Railway Review*, Chicago, Ill., 15c.
(19) *Scientific American Supplement*, New York City, 10c.
(20) *Iron Age*, New York City, 20c.
(21) *Railway Engineer*, London, England, 1s. 2d.
(22) *Iron and Coal Trades Review*, London, England, 6d.
(23) *Railway Gazette*, London, England, 6d.
(24) *American Gas Light Journal*, New York City, 10c.
(25) *Railway Age Gazette*, Mechanical Edition, New York City, 20c.
(26) *Electrical Review*, London, England, 4d.
(27) *Electrical World*, New York City, 10c.
(28) *Journal*, New England Water-Works Assoc., Boston, Mass., $1.
(29) *Journal*, Royal Society of Arts, London, England, 6d.
(30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium, 4 fr.
(31) *Annales* de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand, Brussels, Belgium, 4 fr.
(32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
(33) *Le Génie Civil*, Paris, France, 1 fr.
(34) *Portefeuille Economiques des Machines*, Paris, France.
(35) *Nouvelles Annales de la Construction*, Paris, France.
(36) *Cornell Civil Engineer*, Ithaca, N. Y.
(37) *Revue de Mécanique*, Paris, France.
(38) *Revue Générale des Chemins de Fer et des Tramways*, Paris, France.
(39) *Technisches Gemeindeblatt*, Berlin, Germany, 0, 70m.
(40) *Zentralblatt der Bauverwaltung*, Berlin, Germany, 60 pfg.
(41) *Electrotechnische Zeitschrift*, Berlin, Germany.
(42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, $1.
(43) *Annales des Ponts et Chaussées*, Paris, France.
(44) *Journal*, Military Service Institution, Governors Island, New York Harbor, 50c.
(45) *Colliery Engineer*, Scranton, Pa., 25c.
(46) *Scientific American*, New York City, 15c.
(47) *Mechanical Engineer*, Manchester, England, 3d.
(48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany, 1, 60m.
(49) *Zeitschrift für Bauwesen*, Berlin, Germany.
(50) *Stahl und Eisen*, Düsseldorf, Germany.
(51) *Deutsche Bauzeitung*, Berlin, Germany.
(52) *Rigasche Industrie-Zeitung*, Riga, Russia, 25 kop.
(53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria, 70h.
(54) *Transactions*, Am. Soc. C. E., New York City, $12.
(55) *Transactions*, Am. Soc. M. E., New York City, $10.
(56) *Transactions*, Am. Inst. Min. Engrs., New York City, $6.

(57) *Colliery Guardian*, London, England, 5d.
(58) *Proceedings*, Engrs.' Soc. W. Pa., 2511 Oliver Bldg., Pittsburgh, Pa., 50c.
(59) *Proceedings*, American Water-Works Assoc., Troy, N. Y.
(60) *Municipal Engineering*, Indianapolis, Ind., 25c.
(61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
(62) *Steel and Iron*, Thaw Bldg., Pittsburgh, Pa., 10c.
(63) *Minutes of Proceedings*, Inst. C. E., London, England.
(64) *Power*, New York City, 5c.
(65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
(66) *Journal of Gas Lighting*, London, England, 6d.
(67) *Cement and Engineering News*, Chicago, Ill., 25c.
(68) *Mining Journal*, London, England, 6d.
(69) *Der Eisenbau*, Leipzig, Germany.
(71) *Journal*, Iron and Steel Inst., London, England.
(71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
(72) *American Machinist*, New York City, 15c.
(73) *Electrician*, London, England, 18c.
(74) *Transactions*, Inst. of Min. and Metal., London, England.
(75) *Proceedings*, Inst. of Mech. Engrs., London, England.
(76) *Brick*, Chicago, Ill., 20c.
(77) *Journal*, Inst. Elec. Engrs., London, England, 5s.
(78) *Beton und Eisen*, Vienna, Austria, 1, 50m.
(79) *Forscherarbeiten*, Vienna, Austria.
(80) *Tonindustrie Zeitung*, Berlin, Germany.
(81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
(82) *Mining and Engineering World*, Chicago, Ill., 10c.
(83) *Gas Age*, New York City, 15c.
(84) *Le Ciment*, Paris, France.
(85) *Proceedings*, Am. Ry. Eng. Assoc., Chicago, Ill.
(86) *Engineering-Contracting*, Chicago, Ill., 10c.
(87) *Railway Engineering and Maintenance of Way*, Chicago, Ill., 10c.
(88) *Bulletin* of the International Ry. Congress Assoc., Brussels, Belgium.
(89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa., $5.
(90) *Transactions*, Inst. of Naval Archts., London, England.
(91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
(92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
(93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
(95) *International Marine Engineering*, New York City, 20c.
(96) *Canadian Engineer*, Toronto, Ont., Canada, 10c.
(98) *Journal*, Engrs. Soc. Pa., Harrisburg, Pa., 30c.
(99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, $2.
(100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., 50c.
(101) *Metal Worker*, New York City, 10c.
(102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
(103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
(104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
(105) *Metallurgical and Chemical Engineering*, New York City, 25c.
(106) *Transactions*, Inst. of Min. Engrs., London, England, 6s.
(107) *Schweizerische Bauzeitung*, Zürich, Switzerland.
(108) *Southern Machinery*, Atlanta, Ga., 10c.
(109) *Journal*, Boston Soc. C. E., Boston, Mass., 50c.
(110) *Journal*, Am. Concrete Inst., Philadelphia, Pa., 50c.
(111) *Journal of Electricity, Power and Gas*, San Francisco, Cal., 25c.
(112) *Internationale Zeitschrift für Wasser-Versorgung*, Leipzig, Germany.

LIST OF ARTICLES

Bridges.

Report of Committee 7, Am. Ry. Eng. Assoc., on Wooden Bridges and Trestles. (85) Vol. 15.

Secondary Stresses.* (Appendix C, Report of Committee 15, Am. Ry. Eng. Assoc.) (85) Vol. 15.

Bridge Clearance Diagram. (Appendix E, Report of Committee 15, Am. Ry. Eng. Assoc.) (85) Vol. 15.

Requirements for the Protection of Traffic at Movable Bridges. (Appendix D, Report of Committee 15, Am. Ry. Eng. Assoc.) (85) Vol. 15.

Rolling Loads on Bridges.* J. E. Greiner. (85) Vol. 15.

Concerning Railroad Bridges Movable in a Vertical Plane.* B. R. Leffler. (85) Vol. 15.

A Plea for Beautiful Bridges. H. G. Tyrrell. (Paper read before the Oregon Soc. of Engrs.) (1) Jan.

*Illustrated.

Bridges—(Continued).

Progress of the New Quebec Bridge.* (12) Jan. 29.
Cost of Drilling Anchor-Bolt Holes for the Quebec Bridge.* C. C. Phelps. (13) Feb. 4.
Progress on Summit Cut-Off of the Lackawanna.* (15) Feb. 5.
Five Bridges Erected in Two Days.* (14) Feb. 6.
Half-Mile Concrete Viaduct Provides Double-Deck Trafficway in Kansas City.* H. H. Fox. (14) Feb. 6.
Design Features of the Various Types of Reinforced Concrete Bridges Along the Columbia Highway in Oregon.* K. P. Billner. (86) Feb. 10.
Estimating Curves for Standard Bridges of the Illinois Highway Department.* (86) Feb. 10.
Electrical Control-Gear for Dalmuir Swing-Bridge Over Canal.* (11) Feb. 11.
Wind Stresses in Railroad Bridges. R. Fleming. (13) Feb. 11.
Kilburn Road Bridge, Metropolitan Railway.* (23) Feb. 12.
Mission Street Viaduct.* (13) Feb. 18.
Raising a Highway Bridge by End-Pin Slings.* R. C. Hardman. (13) Feb. 18.
Design, Construction and Detailed Costs of the McKinley Ford Bridge, La Salle County, Illinois.* (86) Feb. 24.
Wind Stresses in Highway Bridges. R. Fleming. (13) Feb. 25.
Equivalent Uniform Loads for Long-Span Bridges. D. B. Steinman. (13) Feb. 25.
Méthode Expéditive pour le Calcul des Voutes.* Mesnager. (33) Feb. 6.
Der steife Bogen oder Rahmen als Sonderfall des geschlossenen steifen Ringes.* J. Melan. (53) Nov. 27.
Umbau der Eisenbahnbrücke über die Wupper in Elberfeld-Sonnborn.* Stephani. (40) Dec. 19.
Die Ufersicherungen unter der Levensauer Hochbrücke bei der Erweiterung des Kaiser-Wilhelms-Kanal.* Walter Menningen. (40) Serial beginning Dec. 23.
Die Neckarbrücke Ziegelhausen-Schlierbach.* Albert Haug. (51) Serial beginning Jan. 21.
Brücke über die Gottleubamündung.* Stecher. (78) Feb. 3.

Electrical.

Service and Tests of Mayari Incline Cables.* James E. Little. (98) Dec.
Electric Light, A Factor in Civilization.* S. E. Doane. (4) Jan.
A New Method for the Measurement of the Logarithmic Decrement of Condensers.* August Hund. (73) Jan. 8.
Electric Accumulators and Their Application to Automobile Traction. R. T. Mitchell. (Paper read before the Assoc. of Engrs.-in-Charge.) (73) Jan. 22.
Modern Electric Lighting. H. C. Wheat. (Paper read before the Rugby Eng. Soc.) (47) Jan. 22.
The Testing of Potentiometers. Frank Wenner and Ernest Weibel. (Abstract of paper from *Bulletin*, Bureau of Standards.) (73) Jan. 29.
Overload Protection on Alternating-Current Circuits by Tripping Devices.* C. C. Garrard. (73) Serial beginning Jan. 29.
Power Circuit Interference with Telegraphs and Telephones.* S. C. Bartholomew. (Abstract of paper read before the Institution of Post Office Elec. Engrs.) (73) Jan. 29.
The Design and Operation of the Cleveland Municipal Electric Plant.* Frederick W. Ballard. (55) Feb.
Distortion of Alternating Current Wave Caused by Cyclic Variation in Resistance.* Frederick Bedell and E. C. Mayer. (42) Feb.
The Characteristics of Electric Motors Involved in Their Application. D. B. Rushmore. (42) Feb.
Searchlights.* C. S. McDowell. (42) Feb.
A 100 000-Volt Portable Substation.* Charles I. Burkholder and Nicholas Stahl. (42) Feb.
Dimmers for Tungsten Lamps.* Alfred E. Waller. (42) Feb.
Effect of Moisture in the Earth on Temperature of Underground Cables.* L. E. Imlay. (42) Feb.
Comparison of Calculated and Measured Corona Loss Curves.* F. W. Peek, Jr. (42) Feb.
Electrical Precipitation Theory of the Removal of Suspended Matter from Fluids. W. W. Strong. (42) Feb.
Oil Circuit Breakers, Notes on Arc Phenomena and Tendencies in Design.* K. C. Randall. (42) Feb.
Concrete Trolley Poles.* (67) Feb.
The Magnetization of Iron at High Flux Density with Alternating Currents.* J. S. Nicholson. (77) Feb. 1.
The Shape of the Pressure Wave in Electrical Machinery.* S. P. Smith and R. S. H. Boulding. (77) Feb. 1.
The Current Transformer.* A. G. L. McNaughton. (77) Feb. 1.
The Constant-Current Transformer.* John A. Randolph. (64) Feb. 2.

*Illustrated.

Electrical—(Continued).

A New Nitrogen Electric Furnace.* E. Kilburn Scott. (Paper read before the Soc. of Chemical Industry.) (26) Feb. 5.
The London & District Electricity Supply Bill. (73) Serial beginning Feb. 5.
Protective Switchgear.* C. Jones. (Paper read before the Assoc. of Min. Elec. Engrs.) (22) Feb. 5.
Across the Continent by Telephone.* (46) Feb. 6.
Inside Wiring Methods.* John Carrell. (111) Serial beginning Feb. 6.
Small-Town Distribution and Management Cost.* (27) Feb. 6.
Concrete Transmission-Line Poles.* R. D. Coombs. (27) Feb. 6.
Seattle Municipal Lighting Plant.* W. L. Kidston. (64) Feb. 9.
The Current Transformer.* M. Rosenbaum. (73) Feb. 12.
Protective Devices Against Lightning and Surges.* E. Kilburn Scott and L. F. Fogarty. (Paper read before the Assoc. of Min. Elec. Engrs.) (22) Serial beginning Feb. 12.
Sporadic Insulator Troubles.* P. M. Downing. (111) Feb. 13.
Illumination of Panama-Pacific Exposition.* G. L. Bayley. (27) Feb. 13.
Two American-Built Locomobile Power Plants.* (27) Feb. 13.
Proportioning of Railway Motor Resistances.* A. M. Buck. (17) Feb. 13.
Separation of the No-Load Stray Losses in a Continuous-Current Machine by Stroboscopic Running-Down Methods. David Robertson. (77) Feb. 15.
Kalamazoo Municipal Plant (for Street Lighting).* Thomas Wilson. (64) Feb. 16.
A Gas-Tractor Power Plant.* C. V. Hull. (64) Feb. 16.
Methods and Costs of Electric Shovel Work Removing Slides and Side Cutting for Electric Railway.* (From the *Excavating Engineer.*) (86) Feb. 17.
Municipal Electric-Lighting Plants in California. (13) Feb. 18.
The Ultrandion Detector for Undamped Waves.* Lee de Forest. (27) Feb. 20.
Electric-Steam Tunnel Crane.* (18) Feb. 27.
Central-Station Development at Portland, Maine.* (27) Feb. 27.
Calculation of Electromagnet Windings.* E. E. George and Harold Pender. (27) Feb. 27.
Les Installations de la Compagnie Parisienne de Distribution d'Electricité. Edouard Imbs. (32) June.
Die elektrische Kraft-und Licht-Betrieb in der Hauptwerkstätte Danzig.* Crayen. (102) Dec. 1.
Riebenschaltungs-Signallampen. L. Bloch. (41) Jan. 21.
Eine gefahrlose metallische Röntgenrohre.* L. Zehnder. (41) Feb. 4.

Marine.

The Geared Turbine Machinery of the *Transylvania.** (11) Serial beginning Jan. 29.
The Works of Canadian Vickers, Limited, at Montreal.* (11) Feb. 5.
Fog and Fog Signals.* Edwin O. Catford. (12) Feb. 5.
The Anchor Liner *Tuscania.** (11) Feb. 12.
A New Car Ferry with Adjustable Deck.* (15) Feb. 26.
Le Ravitaillement en Mer des Navires de Guerre.* (33) Feb. 13.

Mechanical.

The Theory of Hardening and the Constitution of Steel. Edward D. Campbell. (71) Vol. 90.
The Bye-Product Coking Industry and Its Relation to the Manufacture of Iron and Steel.* G. Stanley Cooper. (71) Vol. 90.
Influence of Riveting on the Stresses in the Rivet and on the Strength Properties of the Rivet Material. Hans Rudeloff. (71*a*) Vol. 6.
Modern Bye-Product Coking.* G. Stanley Cooper. (Paper read before the Min. Inst. of Scotland.) (106) Vol. 48, Pt. 2.
Steam Turbine Mill Drive. J. D. Berg. (58) Nov.
Genesis of the Traction Engine. J. L. Mowry. (Paper read before the Civ. Engrs.' Soc. of St. Paul.) (1) Jan.
Formulæ for the Windage of Flywheels. E. Buckingham. (73) Jan. 15.
Rotary Cutting-Off Machine.* (12) Jan. 22.
The Use of Liquid Air in Industry. (11) Serial beginning Jan. 22.
Coke. Vivian B. Lewes. (Paper read before the London and Southern District Junior Gas Assoc.) (66) Jan. 26.
The Removal of Carbon Bisulphide from Coal Gas by Heat. E. V. Evans. (Paper read before the Soc. of Chemical Industry.) (66) Jan. 26.
Aerial Navigation.* R. T. Glazebrook. (Paper read before the Royal Institution.) (11) Serial beginning Jan. 29.
Essential Principles of Engine Design; Also Materials of Construction. Frank Foster. (Paper read before the Manchester Assoc. of Engrs.) (47) Serial beginning Jan. 29.
A Big Consumer's Storage Yard, New York Edison Co.'s Plant at Shadyside, N. J.* J. F. Springer. (45) Feb.
A Large Sand and Gravel Plant.* (67) Feb.

*Illustrated.

Mechanical—(Continued).

The New Keilehaven Gas-Works at Rotterdam.* M. C. Sissingh. (Paper read before the Royal Dutch Inst. of Engrs.) (66) Feb. 2.
Power Requirements of Ammonia Compressors.* W. N. McKee. (64) Feb. 2.
Properties and Selection of Lubricating Oils. E. H. Fish. (72) Feb. 4.
Welding the Joints of Steel Gas Mains.* (13) Feb. 4.
Combined Air Compressor and Vacuum Pump.* (12) Feb. 5.
Report of N. C. G. A. Committee on Indoor Lighting.* Sidney Mason. (24) Feb. 8.
A New Radiometer for Gas-Fire Testing.* (66) Serial beginning Feb. 9.
Oil-Engine Tendencies.* A. E. Ward. (64) Feb. 9.
Performance of Refrigeration Plant at Lubeck, Germany. Richard Stetefeld. (64) Feb. 9.
Town-Gas Engines. A. W. Tookey. (Paper read before the Manchester Junior Gas Assoc.) (66) Feb. 9.
British Portland Cement Making Machinery. (12) Serial beginning Feb. 12.
Martin's Two-Cycle Semi-Diesel Engines.* (11) Feb. 12.
Modern Surface Condensing Plants.* T. R. Houston. (Paper read before the Rugby Eng. Soc.) (47) Feb. 12.
The Jitney Bus. Charles N. Black. (111) Feb. 13.
Cost and Price of Gas in a Small City. Wm. C. Butterworth. (Paper read before the Wisconsin Gas Assoc.) (83) Feb. 15.
Pittsburgh's Progress in Smoke Abatement.* J. W. Henderson. (62) Feb. 15.
Recent Developments in Trenching Machines.* (83) Feb. 15.
Recent Gas Piping Practice in Philadelphia. H. R. Sterrett. (Paper read before the Illuminating Eng. Soc.) (83) Feb. 15.
Suiting the Stoker Design to the Plant.* T. A. Peebles. (62) Feb. 15.
Thirteen Years' Operation of Inclined Retorts.* Frank Huber. (Paper read before the A. G. I. Assoc.) (24) Feb. 15.
Boilers for Isolated Plants. Charles L. Hubbard. (64) Feb. 16.
The High-Speed Gas Engine. R. Embleton. (Paper read before the Junior Institution of Engrs.) (66) Feb. 16.
The Selection of Hauling Machinery and a Graphical Method of Estimating the Comparative Cost of Hauling.* T. R. Agg. (Paper read before the Am. Road Builders' Assoc.) (86) Feb. 17.
The Briquetting of Saskatchewan Lignite.* (96) Feb. 18.
The Rolling Mill as a Machine-Shop Product.* (72) Feb. 18.
Safety Derrick-Hook for Handling Buckets.* N. R. Melvin. (13) Feb. 18.
Electric Pyrometers for Heat Treatment.* (72) Feb. 25.
Oxyacetylene Welding in Mining.* (16) Feb. 27.
The Demand Rate for Gas Service. C. H. Cook. (Paper read before the Wisconsin Gas Assoc.) (83) Mar. 1.
New Coal Gas Plant at Fall River.* C. W. Hunter. (Paper read before the New England Assoc. of Gas Engrs.) (83) Mar. 1.
Ueber neuere Gasreinigungsverfahren.* H. Strache. (53) July 31.
Ist die Berechnung von Dampfleitungen nach Prof. Rietschels Leitfaden zuverlässig? H. Roose. (7) Dec. 12.
Die neue Automobil-Ausstellungshalle am Kaiserdamm in Berlin.* Hans Schmuckler. (48) Jan. 16.
Die Grossdieselmotorschiffe, ihre Wirtschaftlichkeit und ihre Zukunft. Wm. Scholz. (48) Jan. 30.

Metallurgical.

The Oxygen Content of Open Hearth Steel. J. Allen Pickard and F. M. Potter. (71) Vol. 90.
The Determination of Cobalt in High-Speed Steels. Lawrence Dufty. (71) Vol. 90.
The Bye-Product Coking Industry and Its Relation to the Manufacture of Iron and Steel.* G. Stanley Cooper. (71) Vol. 90.
Note on the Transformations of Steels.* H. De Nolly and L. Veyret. (71) Vol. 90.
Mechanical Charging of Blast Furnaces.* N. Kapp. (71) Vol. 90.
Electrolytic Iron, Its Manufacture, Properties, and Uses.* L. Guillet. (71) Vol. 90.
Utilisation of Heat Contained in Slag.* Walter L. Johnson. (71) Vol. 90.
A New Process for Heating Blast Furnace Stoves.* A. Spannagel. (71) Vol. 90.
The Use of Liquid Ferro-Manganese in the Steel Processes.* Axel Sahlin. (71) Vol. 90.
The Influence of Coalescence on the Mechanical Properties of Steel and on Alloys.* A. M. Portevin and V. Bernard. (71) Vol. 90.
The Decarburisation of Steels in the Salt Baths Used for Heating Prior to Hardening. A. M. Portevin. (71) Vol. 90.
Methods of Transport of Raw Material in the Iron Industry.* J. F. Apfelstedt. (71*a*) Vol. 6.
Electric Furnaces for Heating Steel.* Alcan Hirsch. (71*a*) Vol. 6.
The Gases Occluded in Liquid Steel. L. Baraduc-Muller. (71*a*) Vol. 6.
An Examination of Fire Bricks and Some Other Technical Refractory Materials.* W. Hamilton Patterson. (71*a*) Vol. 6.

*Illustrated.

Metallurgical—(Continued).

The Influence of Slag and Fumes on the Zinc Muffle. O. Proske. (Translated from *Metall und Erz*, by F. Sommer Schmidt.) **(103)** Jan. 30.
The Critical Point at 460° C. in Copper-Zinc Alloys.* Carpenter and Edwards. (Paper read before the Inst. of Metals.) **(21)** Feb.
Tube-Milling for the Flotation or Oil-Concentration Process. W. B. Easton. **(105)** Feb.
The Development of Continuous Counter-Current Decantation in Cyanidation of Slime. W. J. Pentland. **(105)** Feb.
Limitations of the Electric Furnace in the Manufacture of Steel Castings. G. Muntz. **(105)** Feb.
Magnetic and Other Properties of Electrolytic Iron Melted in Vacuo.* Trygve D. Yensen. **(42)** Feb.
Chloridizing, Blast Roasting and Leaching.* Glenn A. Keep. **(16)** Serial beginning Feb. 6.
Ore Treatment by the Vandercook Process.* E. C. Morse. **(103)** Feb. 13.
New Filtering Process at the Treadwell Cyanide Plant.* W. P. Lass. **(103)** Feb. 13.
Water-Cooled Equipment for Sheet Mills.* **(20)** Feb. 25.
The Rennerfelt Electric Furnace.* **(16)** Feb. 27.
Power Data in Steel Plant Economics.* Franz Denk. **(62)** Mar. 1.
Frühzündungen an Hochofengasmaschinen und ihre Ursachen. Carl Waldeck. **(50)** Jan. 21.

Military.

The Soixante Quinze (field gun).* **(12)** Jan. 22.
Aircraft in Warfare. H. Bannerman-Phillips. (Abstract of paper read before the North-East Coast Institution of Engrs. and Shipbuilders.) **(47)** Serial beginning Feb. 5.
Aircraft Artillery and Bomb-Dropping.* Carl Dienstbach. **(46)** Feb. 6.
The Maxim Machine Gun and Its Construction.* **(46)** Feb. 6.
Grinding Large Shells and Projectiles.* C. O. Smith. **(20)** Feb. 25.
Les Poudres et les Explosifs.* Daniel Florentin. **(33)** Serial beginning Feb. 13.

Mining.

Description of Water-Dams in Coal at Netherseal Colliery.* C. Dickinson. (Paper read before the Midland Counties Institution of Engrs.) **(106)** Vol. 48, Pt. 2.
The Case for the Electric Lamp. William Maurice. (Paper read before the Midland Inst. of Min., Civ. and Mech. Engrs.) **(106)** Vol. 48, Pt. 2.
Coal-Mining in the State of Pennsylvania, United States of America.* Samuel Dean. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) **(106)** Vol. 48, Pt. 2.
A Firedamp Indicator.* H. R. Webster. (Paper read before the Midland Inst. of Min., Civ. and Mech. Engrs.) **(106)** Vol. 48, Pt. 2.
The Killingworth Colliery (New South Wales) Explosion.* James Ashworth. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) **(106)** Vol. 48, Pt. 2.
The Maikop Oilfield, South Russia.* William Calder. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) **(106)** Vol. 48, Pt. 2.
Substitutes for Wooden Supports of the Roof in Longwall Working. W. Hutton Hepplewhite. (Paper read before the Midland Counties Institution of Engrs.) **(106)** Vol. 48, Pt. 2.
Electrification of the Seaham Colliery.* Frederick C. Coleman. **(57)** Jan. 22.
Exhaust-Steam Turbine Installation at the Silksworth Colliery.* Frederick C. Coleman. **(22)** Jan. 22.
Methods of Adjusting Mining Rates.* Leo Gluck. **(45)** Feb.
Mine Gases. Frank Haas. (Paper read before the W. Va. Min. Inst.) **(45)** Feb.
Electric Winding Engines at Lumley Sixth Colliery.* **(22)** Feb. 5.
Centrifugal Pumping Plant at a South African Mine.* E. G. Izod and A. P. Rouillard. (Paper read before the South African Institution of Engrs.) **(57)** Feb. 12.
Mining Engineering Problems in South African Diamond Development.* Gardner F. Williams. **(82)** Serial beginning Feb. 13.
Shaft-Sinking at Kelvin, Arizona.* A. L. Flagg. **(103)** Feb. 13.
Rapid Construction of Mine Tunnel, Methods and Costs.* **(86)** Feb. 17.
Design of Angle-Sheave Frames.* Floyd L. Burr. **(16)** Serial beginning Feb. 20.
Gold Mining in Bolivia.* Francis Church Lincoln. **(16)** Feb. 20.
L'Efficacité des Parachutes pour Cages d'Extraction dans les Mines.* **(33)** Feb. 13.

Miscellaneous.

A Modern Franchise for a Public Service Corporation. Charles Carroll Brown, M. Am. Soc. C. E. **(60)** Feb.
The Engineer and Publicity. C. E. Drayer. **(55)** Feb.

*Illustrated.

Miscellaneous—(Continued).

The Future of the Police Arm from an Engineering Standpoint. Henry Bruère. **(55)** Feb.
The Flow of Sand Through Orifices. **(96)** Feb. 11.
Lord Kelvin's Work on Gyrostatics.* A. Gray. **(77)** Feb. 15.
Appraisal of City Real Estate.* William E. Davies. (Abstract from Report to Real Estate Board of New York.) **(86)** Feb. 24.
Fifteen Years' Wage Increases in the Canadian Northwest. **(13)** Feb. 25.
A Novel Plan for Stopping a Landslide at Mount Vernon.* N. H. Darton. **(13)** Feb. 25.

Municipal.

The Corliss Street Improvement at Pittsburgh.* Nathan Schein. **(98)** Dec.
Concrete Roads *vs.* Concrete Foundations. W. W. Crosby, M. Am. Soc. C. E. **(104)** Jan. 22.
Brick Paving on Steep Grades, a Report of Recent Practice in Toronto, Ont.* F. A. Churchill. **(60)** Feb.
Training for City Employes in the Municipal Colleges of Germany. Clyde Lyndon King. **(55)** Feb.
Snow Removal, A Report of the Committee on Resolutions of the Snow Removal Conference Held in Philadelphia, April 16 and 17, 1914. **(55)** Feb.
Some Factors in Municipal Engineering. Morris Llewellyn Cooke. **(55)** Feb.
Supply and Use of Water in Concrete Road Building. C. D. Franks. (Paper read before the Indiana Eng. Soc.) **(60)** Feb.
Treated Wood Block Pavements, Their History in the United States.* (Report of Committee of the Am. Wood Preservers' Assoc.) **(60)** Feb.
Methods and Cost of Constructing a Concrete Road in La Salle Co., Illinois.* B. H. Piepmeir. (Paper read before the Illinois Soc. of Engrs. and Surveyors.) **(86)** Feb. 3.
A Modification of the New York Standard Guard Rail Providing Concrete Posts.* H. E. Smith. **(86)** Feb. 3.
Methods and Cost of Constructing Nine Miles of Concrete State Road in California. J. B. Woodson. (From *California State Highway Bulletin.*) **(86)** Feb. 3.
Dry Sand and Cement Mixture *vs.* Mortar Bed for Wood Block Pavements. Theodor S. Oxholm. (Paper read before the Am. Assoc. for the Advancement of Science.) **(13)** Feb. 4.
Notes on Extraordinary Traffic. F. Oscar Kirby. (Paper read before the Institution of Mun. and County Engrs.) **(104)** Feb. 5.
Method and Cost of Concrete Road Construction by Day Labor Under the Supervision of the Illinois Highway Commission.* A. H. Hunter. (Paper read before the Illinois Soc. of Engrs. and Surveyors.) **(86)** Feb. 10.
Patching Bituminous Pavements without an Asphalt Plant or a Steam Roller.* Samuel H. Lea. **(18)** Feb. 11.
Practical Kinks in Concrete Road and Pavement Construction.* C. D. Franks. (Paper read before the Indiana Soc. of Engrs.) **(86)** Feb. 10; **(14)** Feb. 13.
Build Brick Road on Machine-Leveled Subgrade. **(14)** Feb. 13.
Limits Manhattan Pavements to Three Standard Types. H. W. Durham. **(14)** Feb. 13.
Storm King Road a Shelf Blasted in Mountainside 400 Feet Above the Hudson.* **(14)** Feb. 13.
Value of Paving Materials Disclosed by Two Years' Service Test in New York. H. W. Durham. **(14)** Feb. 13.
Service Tests of Stone Block Pavements in Brooklyn. H. H. Schmidt. (Paper read before the Am. Assoc. for the Advancement of Science.) **(86)** Feb. 17.
Some Features of Brick Road Construction in Illinois. Rodney L. Bell. (Paper read before the Illinois Soc. of Engrs. and Surveyors.) **(86)** Feb. 17.
The Municipal Asphalt Plant.* **(13)** Feb. 18.
The Stockton Street Tunnel in San Francisco.* **(13)** Feb. 18.
Street Pavements, Roads and Boulevards.* **(13)** Feb. 18.
Municipal Plant Reduces Asphalt Maintenance Cost in New York. **(14)** Feb. 20.
San Francisco's Notable Engineering Works.* **(14)** Feb. 20.
Surveys and Construction Plans for Trunk Line Road Construction in Michigan.* **(86)** Feb. 24.
The Manufacture of Granite Paving Blocks.* **(13)** Feb. 25.
Importance of Grades Increases with Betterment of Road. E. B. McCormick. (Abstract of paper read before the Am. Soc. of Agri. Engrs.) **(14)** Feb. 27.
Gas und Elektrizität für Strassenbeleuchtung.* **(107)** Jan. 16.

Railroads.

Report of Committee 1, Am. Ry. Eng. Assoc., on Roadway.* **(85)** Vol. 15.
Report of Committee 2, Am. Ry. Eng. Assoc., on Ballast.* **(85)** Vol. 15.
Report of Committee 3, Am. Ry. Eng. Assoc., on Ties.* **(85)** Vol. 15.
Report of Committee 9, Am. Ry. Eng. Assoc., on Signs, Fences and Crossings.* **(85)** Vol. 15.

*Illustrated.

Railroads—(Continued).

Report of Committee 16, Am. Ry. Eng. Assoc., on Economics of Railway Location. (85) Vol. 15.
Report of Committee 11, Am. Ry. Eng. Assoc., on Records and Accounts.* (85) Vol. 15.
The Unification of the Freight Terminals of a Large City.* Geo. H. Kimball. (85) Vol. 15.
Grade Reduction Problems.* C. P. Howard. (85) Vol. 15.
Extra Top Width for New Fills.* J. C. L. Fish. (85) Vol. 15.
The Elimination of Grade Crossings on the New York, Chicago & St. Louis Railroad in Cleveland, Ohio.* A. J. Himes. (85) Vol. 15.
The Air-Seasoning of Timber.* William H. Kempfer. (85) Vol. 15.
Experiment with Treated Cross-Ties, Wood Screws, and Thiollier Helical Linings.* W. C. Cushing. (85) Vol. 15.
Notes on L. C. L. Freight Houses.* E. H. Lee. (85) Vol. 15.
Report of Committee 5, Am. Ry. Eng. Assoc., on Tracks.* (85) Vol. 15.
Tunnel Construction and Ventilation. (Report of Sub-Committee B of Committee 1, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Influence of Aluminum and Silicon on Bessemer Ingots and Rails.* M. H. Wickhorst. (Appendix F, Report of Committee 4, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Seams in Rails as Developed from Cracks in the Ingot.* M. H. Wickhorst. (85) Vol. 15.
Influence of Seams or Laminations in Base of Rail on Ductility of Metal.* H. B. MacFarland. (85) Vol. 15.
Comparison of Basic and Acid Open-Hearth Rails, and Influence of Reheating Cold Blooms.* M. H. Wickhorst. (85) Vol. 15.
Rail Failure Statistics for the Year Ending October 31, 1912. R. Trimble. (Appendix A, Report of Committee 4, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Influence on Rails of Amount of Draft in Blooming.* M. H. Wickhorst. (85) Vol. 15.
Report of Committee 4, Am. Ry. Eng. Assoc., on Rail.* (85) Vol. 15.
Report of Committee 14, Am. Ry. Eng. Assoc., on Yards and Terminals.* (85) Vol. 15.
Report of Committee 10, Am. Ry. Eng. Assoc., on Signals and Interlocking.* (85) Vol. 15.
Report of Committee 12, Am. Ry. Eng. Assoc., on Rules and Organization. (85) Vol. 15.
Recent Developments in the Heat Treatment of Railway Gearing.* W. H. Phillips. (58) Nov.
Public Service Commission Decisions. George Ross Hull. (98) Dec.
Possibility of Fire from Locomotive Sparks. L. W. Wallace. (61) Dec. 15.
Car Repair Plant of the Northwest System, Pennsylvania Lines West, Indiana Harbor, Ind.* (18) Jan. 6.
Electrification on the Chicago, Milwaukee and St. Paul Railway.* (12) Jan. 29; (26) Feb. 12.
The Prieska-Upington Railway.* (23) Jan. 29.
Rolled and Forged Steel Pistons.* W. W. Scott. (Paper read before the Railway Club of Pittsburgh.) (47) Jan. 29.
New Express Locomotives—Shanghai-Nanking Railway.* (23) Jan. 29.
Tonnage Rating and Results Therefrom.* J. M. Daly. (65) Feb.
Sound Steel for Rails and Structural Purposes.* Robert A. Hadfield. (3) Feb.
Repairing Locomotive Boiler Tubes.* N. H. Ahsinolh. (25) Feb.
Japanese Railways Dynamometer Car.* Edward C. Schmidt. (25) Feb.; (18) Jan. 6.
Jersey Central Freight Car Repair Shops.* (25) Feb.
Southern Locomotive Valve Gear.* R. S. Mounce. (25) Feb.
Steel Frame Box Cars for the Illinois Central.* (25) Feb.
Signalling Installations; Baker Street Station, Metropolitan Railway.* (21) Feb.
Inspection of Copper for Locomotive Purposes.* (21) Feb.
Design Features of the Lake Shore & Michigan Southern Ry. Engine Terminal at Air Line Junction, Ohio.* (86) Feb. 3.
Powerful Mineral Locomotives for South Wales Railways.* (57) Feb. 5.
Mechanical Stoking.* Edward Kenyon. (Paper read before the South Wales Inst. of Engrs.) (57) Serial beginning Feb. 5.
Recent Additions to Union Pacific Freight Equipment.* (15) Feb. 5; (25) Feb.
New Tank Locomotives for the Central Argentine Railway.* (23) Feb. 5.
Railway Development in the Philippine Islands.* C. H. Farnham. (23) Serial beginning Feb. 5.
Three-Phase Italian Passenger Locomotives.* G. Pontecorvo. (17) Feb. 6.
Illumination Features of Montreal Station.* (27) Feb. 6.
Reinforced-Concrete Roundhouse at Du Bois.* (14) Feb. 6.
New Passenger Car Equipment, Union Pacific R. R.* (18) Feb. 6.
A Deseaming Process for Rail-Sections. (96) Feb. 11.
Great Eastern R. R. Suburban Passenger Tank Engine.* (12) Feb. 12.

*Illustrated.

Railroads—(Continued).

Plans for the New Union Station at St. Paul, Minn.* **(15)** Feb. 12.
New Passenger Locomotives for the Midland & South-Western Junction Railway.* **(23)** Feb. 12.
A Method for Finding the Annual Charges for Ties.* Harrington Emerson and T. T. Bowen. (Paper read before the Am. Wood Preservers' Assoc.) **(86)** Feb. 17.
The Snoqualmie Tunnel, C., M. & St. P. Ry.* **(13)** Feb. 18; **(14)** Feb. 13.
Terminal Improvements of the Canadian Pacific Railway at Vancouver, B. C.* **(13)** Feb. 18.
Commodity Rates to the Pacific Coast Terminals. **(15)** Feb. 19.
Jersey Central Steel Baggage and Mail Equipment.* **(15)** Feb. 19.
Spokane Terminal Improvement Involved Variety of Engineering Construction.* **(14)** Feb. 20.
Vanadium Steel Rails of 105 lb. Section, D., L. & W. R. R.* **(18)** Feb. 20.
Elkhorn Extension of the Carolina, Clinchfield & Ohio Ry.* **(18)** Feb. 20.
Modernizing Locomotives on the Kansas City Southern.* **(15)** Feb. 26.
New Roof Shield Used for Driving Railroad Tunnel in Soft Earth.* **(14)** Feb. 27.
Steel Frame Caboose, Buffalo, Rochester & Pittsburgh Ry.* **(18)** Feb. 27.
New Freight and Transfer Station at Pittsburgh, Pa., Pennsylvania R. R.* **(18)** Feb. 27.
Appraisal Report of Père Marquette Railroad Fills Ten Large Boxes.* **(14)** Feb. 13.
Les Voies et Moyens de Communications au Maroc Occidental.* J. Legrand. **(32)** June.
Nouvelles Locomotives à Quatre Essieux Moteurs des Chemins de Fer de l'Etat Italien.* **(33)** Jan. 23.
L'Introduction du Raccordement Progressif dans le Tracé des Voies Ferrées qui en sont Dépourvues.* Luigi Scuderi. **(33)** Jan. 30.
Installations pour le Chargement Rapide du Charbon sur les Tenders des Locomotives des Chemins de Fer Italiens.* **(33)** Feb. 6.
Der Umbau des Hauptbahnhofs Köln (1909 bis 1914).* Ernst Kraft. **(49)** Pt. 1.
Die Buchenschwelle.* Oskar Thomann. **(53)** Serial beginning July 31.
Die geschichtlichen Lokomotiven der k. k. österreichischen Staatsbahnen. Hermann R. v. Littrow. **(53)** Serial beginning Sept. 18.
Rationelle Vorgänge der Absteckung bedeutend langer Eisenbahn-Tunnels.* Anton Tichy. **(53)** Serial beginning Nov. 27.
Gesetzmässigkeiten in der Verdampfung der Lokomotivkessel und im Verhalten der Lokomotivzugkraft.* J. Meyer-Absberg. **(102)** Dec. 1.
Zeiger für Ablaufberge.* Becker. **(102)** Dec. 1.
Gruppenantrieb von Wagenhebeböcken gewöhnlicher Bauart.* H. Gunzelmann. **(102)** Dec. 15.
Entseuchungsanlagen für Eisenbahnwagen. Schmedes. **(102)** Dec. 15.
Gleisunterhaltung mit elektrischen Werkzeugen.* G. Schimpff. **(102)** Dec. 15.
Mittelwerte der Geschwindigkeit des Fahrwiderstandes und der Leistung von Eisenbahnzügen.* A. Langrod. **(102)** Dec. 15.
Bahnhof Nowawes-West.* **(80)** Dec. 17.
Stützmauer aus Eisenbeton.* Kupfer. **(80)** Dec. 22.
Neuerungen im Giessereibetriebe der K. Lokomotivwerkstätte Aalen.* C. Hassler. **(102)** Jan. 1.
Schienenstosse.* J. H. A. Haarman. **(102)** Serial beginning Jan. 1.
Ueber unschädliche Steigungen bei Eisenbahnen.* Weida. **(102)** Jan. 1.
Ueber den Einfluss von Stichmassfehlern bei Kurbelgetrieben elektrischer Lokomotiven.* A. Wichert. **(41)** Serial beginning Jan. 14.
Amerikanische Dampflokomotiven grosser Leistung.* J. Weber. **(107)** Jan. 16.
Der Ausbau der Druckpartie im Simplontunnel II, Km. 4 452 bis 4 500 ab Südportal.* F. Rothpletz. **(107)** Serial beginning Jan. 23.
Elektrische Betriebe auf Postbahnhöfen.* Kasten. **(41)** Serial beginning Jan. 28.
Erfahrungen mit Kugellagern im Betriebe der Montreux-Berner-Oberland-Bahn.* R. Zehnder-Spoerry. **(107)** Jan. 30.

Railroads, Street.

Method of Constructing Rock Tunnel of 50-Ft. Clear Width, Stockton St., San Francisco.* E. G. Tilton. **(86)** Feb. 3.
New Cars for New Orleans.* **(17)** Feb. 6.
New Subway and Elevated Car of the New York Municipal Railway Corporation.* **(18)** Feb. 13.
A Solution for the Snow Problem.* **(17)** Feb. 13.
Municipal Street Railways.* **(13)** Feb. 18.
The Twin Peaks Tunnel. **(13)** Feb. 18.
Front Entrance, Center-Exit Car for Cleveland.* **(17)** Feb. 20.
Die elektrischen Stadtschnellbahnen der Vereinigten Staaten von Nordamerika; Anlage, Bau und Betrieb der Stadtbahnen in Newyork, Boston, Philadelphia, Pittsburg, Chikago, St. Louis und Providence. F. Musil. **(102)** Serial beginning Jan. 1.

*Illustrated.

Sanitation.

Refuse Collection and Disposal.* E. N. Stacy. (Paper read before the Civ. Engrs.' Soc. of St. Paul.) (1) Jan.
The Handling of Sewage Sludge.* George S. Webster. (55) Feb.
Making over a Small Sewage-Treatment Plant at Moorestown, N. J.* (13) Feb. 4.
Operation of the Plainfield Sewage-Works. John R. Downes. (13) Feb. 4.
The Sanitation of Iquitos, Peru.* G. M. Converse. (13) Feb. 4.
Theater Cooling, Ventilation and Heating.* (101) Feb. 5.
Design and Construction of the Market Street Flood Channel, Burlington, Ia.* Carl T. Bowen. (86) Feb. 10.
Design and Construction Features of Reinforced Concrete Sewer Siphons Under New York Subways. Thad. L. Wilson. (Paper read before the Brooklyn Engrs.' Club.) (86) Feb. 10.
Design, Construction and Cost of New Sanitary Sewerage System at Alton, Ill. J. E. Schwaab. (Paper read before the Illinois Soc. of Engrs. and Surveyors.) (86) Feb. 10.
Heating and Ventilating Industrial Plants.* E. L. Hogan. (Paper read before the Am. Soc. of Heating and Ventilating Engrs.) (101) Feb. 12.
Science in Developing Gas Heating. W. R. Twigg. (Paper read before the Institution of Heating and Ventilating Engrs.) (66) Feb. 16.
Costs of San Francisco Sewers. (13) Feb. 18.
Earth Tunnel for Pipe Sewer at Virginia, Minn.* (13) Feb. 18.
Garbage and Refuse Disposal and Experiences with Incineration at San Francisco.* (13) Feb. 18.
Laying a Submerged Sewer Outlet at San Francisco.* (13) Feb. 18.
San Francisco's Sewerage System.* (13) Feb. 18.
Pneumatic Outfit Delivers Concrete 1 300 Feet to Tunnel Forms.* (14) Feb. 20.
Sheeting and Pumping Methods for Chicago Sewer Trench.* (14) Feb. 20.
Ventilation and Other Features of Exposition Auditorium at San Francisco.* (14) Feb. 20.
Some Considerations Affecting the Collection and Disposal of Sewage at Seaside Resorts.* Marshall A. Pugh. (Paper read before the Am. Assoc. for the Advancement of Science.) (86) Feb. 24.
Heating and Ventilating Industrial Plant.* J. H. O'Brien. (101) Feb. 26.
Warm Air Furnace in Trying Location.* (101) Feb. 26.
Maintenance of Sewers and Disposal Works Demands Treatment of Injurious Trade Wastes. W. L. Stevenson. (14) Feb. 27.
Two Years' Tests Indicate Best Treatment for Chicago Stock Yards Wastes.* (14) Feb. 27.
Die Wasserversorgung für die Fabriken und die Abwässerfrage. P. Rohland. (112) Sept. 16.
Die Heizungs- und Lüftungsanlage des neuen Rathauses der Stadt Berlin-Schöneberg.* Alex. Marx. (7) Dec. 5.
Die Rauchbekämpfung in den Städten. Hugo Kuhl. (39) Dec. 5.
Die Lösung der Heizfrage bei Gemäldegalerien und ähnlichen Sammlungsbäuden.* R. Stegemann. (7) Dec. 12.
Einfluss der Umgebung auf die Wärmeabgabe des menschlichen Körpers. Wobsa. (7) Serial beginning Dec. 19.

Structural.

The Transverse Testing of Cast Iron.* George Hailstone. (71) Vol. 90.
Waterproofing Masonry and Bridge Floors.* (Appendix A, Report of Committee 8, Am. Ry. Eng. Assoc.) (85) Vol. 15.
The Use of Refined Coal-Tar in the Creosoting Industry.* Hermann von Schrenk and Alfred L. Kammerer. (Appendix A, Report of Committee 5, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Report of Committee 6, Am. Ry. Eng. Assoc., on Buildings.* (85) Vol. 15.
Report of Committee 8, Am. Ry. Eng. Assoc., on Masonry. (85) Vol. 15.
Disintegration of Concrete and Corrosion of Reinforcing Metal. (Appendix C, Report of Committee 8, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Coatings. (Appendix B, Report of Committee 8, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Column Tests. (Appendix B, Report of Committee 15, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Methods of Protection of Iron and Steel Structures Against Corrosion. (Appendix A, Report of Committee 15, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Report of Committee 15, Am. Ry. Eng. Assoc., on Iron and Steel Structures. (85) Vol. 15.
Corrosion Tests of Iron and Steel. (Appendix A, Report of Committee 13, Am. Ry. Eng. Assoc.) (85) Vol. 15.
Rotary Bend Tests, Alternating Bend Tests, and Repeated Shock Tests.* E. Nusbaumer. (71a) Vol. 6.
Modern Uses of Wood.* Hermann von Schrenk. (4) Jan.
The Works of the Cambridge Scientific Instrument Co., Ltd.* (73) Jan. 15.

*Illustrated.

Structural—(Continued).

Johannesburg Town Hall and Municipal Offices.* (104) Jan. 29.
Testing and Handling of Aggregates for Concrete. H. S. Mattimore. (Paper read before the Assoc. of Am. Portland Cement Mfrs.) (60) Feb.; (13) Feb. 4.
How Reading is Solving the Housing Problem.* H. Winslow Fegley. (76) Feb. 2.
A Concrete Chuting Plant with Braced Boom and Chute.* Everett L. Jones. (13) Feb. 4.
Pouring Concrete by Compressed Air.* (96) Feb. 4.
Pulling Steel Sheetpiles with an Inverted Steam Hammer.* (13) Feb. 4.
Putting Down Deep Foundation Piers in Long Island City.* (13) Feb. 4.
Some Experiences with Concrete in the Republic of Panama.* Alex. P. Crary. (13) Feb. 4.
Standard Practice Instructions for Concrete Testing Laboratory.* Ralph E. Goodwin. (13) Feb. 4.
U-Bolt Splice in Heavy Reinforcing Bars.* Thomas C. Atwood. (13) Feb. 4.
Wind Stresses in Steel Millbuildings.* R. Fleming. (13) Feb. 4.
Mechanical Disintegration of Defective Concretes.* Nathan C. Johnson. (14) Feb. 6.
Economic Design of Concrete Slabs.* J. Norman Jensen. (14) Feb. 6.
Protection from Earthquakes. Th. Moreux. (19) Feb. 6.
Wide Column Spacing Effects Economy in Factory Floor Area.* Eugene W. Stern. (14) Feb. 6.
Specifications for Concrete Aggregates and Results of Field Tests.* Ralph E. Goodwin. (13) Feb. 11.
Building By-Laws and a Court of Appeal. H. D. Searles-Wood. (Paper read before the Institution of Mun. and County Engrs.) (104) Feb. 12.
The Mappin Terraces at the Zoo.* R. N. Stroyer. (12) Feb. 12.
Model Factory Building for Small Plants.* (101) Feb. 12.
Microscope as an Aid in Proportioning Concrete for Strength.* (14) Feb. 13.
Only Creosote Properly Applied Withstands Teredo. E. S. Christian. (Paper read before the Am. Wood Preservers Assoc.) (14) Feb. 13.
Structural Features of Northwestern-Mutual Life Insurance Building, Milwaukee.* (14) Feb. 13.
Brick the Scapecoat of the Great Concrete Fire at West Orange.* (76) Feb. 16.
End Framing for Armory at University of Illinois and Some General Features of This Structure.* (86) Feb. 17.
Engineering Problems of the Panama-Pacific Exposition.* A. H. Markwart. (13) Feb. 18.
Field Concrete Better than Test-Sample Concrete. R. E. Goodwin. (13) Feb. 18.
Hardness Tests of Cold-Rolled Steel. William K. Shepard and Charles T. Porter. (72) Feb. 18.
Plumbing Equipment of Swimming Pool.* (101) Feb. 19.
Compressive Strength of Concrete Test Blocks. (14) Feb. 20.
Column Design for Steel and Wood Construction; System Used by the Port of Seattle Commission.* (14) Feb. 20.
Mixing and Placing Concrete with High Pressure Steam Gives Dense Product at Low Cost.* (14) Feb. 20.
Underwriters and Fire Protection Association Report on Edison Fire, Behavior of Concrete is Fully Discussed.* (14) Feb. 20; (13) Feb. 18.
Paints Which Resist Darkening by Gases, Soot, etc. Henry A. Gardner. (13) Feb. 25.
Overhang Piledriver.* Leonard Goodday. (13) Feb. 25.
Felling a Brick Chimney.* Charles A. Mead. (13) Feb. 25.
A Unique Method of Sinking Shafts in Soft Ground.* Lloyd T. Emory. (13) Feb. 25.
Frozen Concrete Responsible for Building Collapse.* Otto E. Eckert. (14) Feb. 27.
Concrete Briquettes Subjected to Cold Weather Tests. (14) Feb. 27.
Microscope as a Check on Construction.* Nathan C. Johnson. (14) Feb. 27.
The Great International Panama-Pacific Exposition.* (46) Feb. 27.
Concrete-Pile Holder Foundation.* Francis E. Drake. (Paper read before the New England Assoc. of Gas Engrs.) (83) March 1.
L'Influence du Traitement sur les Propriétés des Aciers à Outils.* (33) Jan. 23.
Das städtische Museum und die Haken-Terrasse in Stettin.* Wilhelm Meyer-Schwartau. (49) Pt. 1.
Ermittelung der Abmessungen einfach und doppelt bewehrter Eisenbeton-Querschnitte bei reiner Biegung sowie exzentrischem Druck und Zug.* Thieme. (51) Sup. No. 2.
Schachtanlage und Trass-Silo auf der Grube "Idylle" in Kruft (Rhld.)* Paul Müller. (51) Serial beginning Sup. No. 2.
Eisenbetonbauten für Bierbrauereien.* Hans Schäfer. (80) Nov. 28.
Schalungen für Betonbauten.* (80) Dec. 5.
Durchbiegung von Eisenbetonplatten.* G. Kaufmann. (80) Dec. 12.
Rostschutz.* R. W. Schaechterle. (102) Dec. 15.

*Illustrated.

Structural—(Continued).

Die Kerbschlagprobe und das Aehnlichkeitsgesetz. R. Stribeck. (48) Jan. 16.
Die Eisenbetonkonstrucktionen des Palace-Hotel Bellevue in Bern.* Terner & Chopard. (107) Serial beginning Jan. 16.
Die Volumen-und Formänderungen des Stahles beim Härten. E. H. Schulz. (48) Serial beginning Jan. 23.
Der Giessen'sche Winddruckmesser.* (107) Jan. 30.
Bestimmung der Eisenquerschnitte in doppelt bewehrten Verbundquerschnitten bei gegebener Konstruktionshöhe.* A. Herndl. (78) Feb. 3.
Der Eisenbeton beim Neubau eines Verwaltungsgebäudes der Chemischen Fabrik von E. Merck bei Darmstadt.* H. Steinberger. (78) Feb. 3.

Topographical.

Practice in City Survey Monuments and Benchmarks.* (13) Feb. 11.
The Computing Machine for Areas of Irregular Tracts.* C. D. Norton. (13) Feb. 25.
Horizontal Cross-Hair Adjustment of the Engineer's Transit.* M. F. Sayre. (13) Feb. 25.
Supplementing the Canadian Public Land Surveys by Rapid Stadia Work.* J. A. Macdonald. (13) Feb. 25.
Profilinstrumente mit gerader Skala.* Gg. Keinath. (41) Jan. 21.

Water Supply.

Report of Committee 13, Am. Ry. Eng. Assoc. (85) Vol. 15.
Report of Committee 19, Am. Ry. Eng. Assoc., on Conservation of Natural Resources. (85) Vol. 15.
Re-Lining a Small Reservoir.* Morris Knowles. (98) Dec.
Madras City Water Supply.* (104) Jan. 22.
The Effect of the Width of the Channel of Approach on the Flow of Water Over Weirs.* W. F. Martin. (36) Feb.
The Economic Depth of Trickling Filters. Harrison P. Eddy. (109) Feb.
The Choice of Pumping Engines for Municipal Water Supply. J. E. Craig. (36) Feb.
Water Works Plant of River Forest, Illinois.* Karl M. Mitchell. (60) Feb.
A Study of Cleaning Filter Sands with No Opportunity for Bonus Payments. Sanford E. Thompson. (55) Feb.
Single-Stage Centrifugal Pumps.* Eugene B. Wilson. (45) Feb.
Notes in Connection with the Work in the Hydrographic Department of the Porto Rico Irrigation Service. F. K. Knapp. (36) Feb.
Municipal Pumping Stations of Detroit.* Thomas Wilson. (64) Feb. 2.
Considerations Affecting the Selection of Deep Well Pumping Machinery. Douglas A. Graham. (Paper read before the Illinois Soc. of Engrs.) (86) Feb. 3.
Method and Results of Strength Tests on Strainer Plates for Baltimore Water Filters.* (86) Feb. 3.
An Example of State Regulation of the Operation of a Small Water Works in Pennsylvania. (86) Feb. 3.
Progress on the Greater Winnipeg Aqueduct.* (13) Feb. 4.
Power Development at Kananaskis Falls.* K. H. Smith. (96) Serial beginning Feb. 4.
The Alabama Power Scheme.* (12) Feb. 5.
Design Low Dam for 30-Foot Height Increase.* (14) Feb. 6.
Design Features of Cottonwood Conduit and New Concrete Settling Basin at San Diego, Calif.* (86) Feb. 10.
The Valier-Montana Irrigation Project.* Kenneth A. Heron. (13) Feb. 11.
The Niagara Power Situation. Arthur V. White. (From Report to the Comm. of Conservation of Canada.) (96) Feb. 11.
Power Plant at Donnaconna, Quebec.* (96) Feb. 11.
Interesting Chart of Pittsburgh Water System, Showing Its Recent Transformation.* (13) Feb. 11.
The California Pumping Station of the W. Gloucester Water Co.* (12) Feb. 12.
New Indianapolis Pumping Station Designed for Continuous Service.* (14) Feb. 13.
Install Huge Balanced Valves at Arrowrock Dam.* (14) Feb. 13.
Hydraulic Fill Dam for an Earthquake Region—Work on the Calaveras Reservoir of the San Francisco Water Supply.* (46) Feb. 13.
Yardage Record at Kensico Dam Due, in Part, to Operation of Mixers. George T. Seabury. (14) Feb. 13.
Change of Runners Permits 100 Per Cent. Head Increase. (14) Feb. 13.
Failure of 60-in. Water Main at Cincinnati by Longitudinal Compression.* John W. Alvord. (86) Feb. 17; (13) Feb. 25.
The Possibilities of Hydro-Electric Power in the Pacific Northwest.* Geo. H. Moore. (13) Feb. 18.
Eugenia Falls Earth Storage Dam.* R. T. Hyland. (96) Feb. 18.

*Illustrated.

Water Supply—(Continued).

A Plan for Municipal Irrigation from the Los Angeles Aqueduct.* Burt A. Heinly. (13) Feb. 18.
San Francisco's Future Water Supply; Hetch Hetchy Project.* (13) Feb. 18.
San Francisco's Auxiliary Water-Supply for Fire Protection.* (13) Feb. 18.
Service Secured from Corrugated Iron Culverts.* (15) Feb. 19.
Data and Discussion on Relative Efficiency of Liquid Chlorine and Hypochlorite of Lime. Frank E. Hale. (Paper read before the New Jersey San. Assoc.) (86) Feb. 24.
The Development Plan for the Water Distribution System of the City of San Diego, Cal. P. H. Thearle. (86) Feb. 24; (13) Feb. 18.
New City Reservoir, Regina, Sask.* R. O. Wynne-Roberts. (96) Feb. 25.
Progress on Arrowrock Dam.* Charles H. Paul. (13) Feb. 25.
Water and Other Utility Service Standards of the Railroad Commission of Oregon. (13) Feb. 25.
A Unique Problem in Valuation; Inheritance Tax Appraisal of the Hales Bar Hydro-Electric Plant. Louis L. Tribus. (13) Feb. 25.
Rectangular Fire-Service Reservoir, Auxiliary Structure Built Above Ground, Fed by 8-Inch Artesian Well.* W. G. Potter. (14) Feb. 27.
Covering Protects Large Penstocks from Freezing.* H. G. Huber. (14) Feb. 27.
Closure made at Elephant Butte Dam, New Mexico. (14) Feb. 27.
Die Abmessungen der Wasserfassung beim dritten Wasserwerk der Stadt Leipzig.* G. Thiem. (112) Serial beginning Mar. 1.
Die Wasserversorgung der Stadt Budapest.* Emerich Forbáth. (112) Serial beginning Apr. 1.
Herstellung kupferner Tiefbrunnen für die Wasserversorgung der Stadt Malmö in Südschweden. J. Gust. Richert. (112) May 1.
Kommen die in den Quellen mancher Trinkwasserleitungen enthaltenen Fische als Bazillenträger in Frage und schädigen sie so die Qualität des Wasser? Paul Th. Müller. (112) May 1.
Die neuen Trinkwasserfilter der Stadt St. Louis. Ed. Imbeaux. (112) May 1.
Bleivergiftungen im Zusammenhang mit Wasserversorgung.* W. P. Dunbar. (112) Serial beginning May 16.
Zur Frage des Grundwassers im Karst. Alfred Grund. (112) May 16.
Die Wassertürme der Stadt Leipzig.* Wilhelm Scharenberg. (112) Serial beginning May 16.
Die Wasserversorgung der Stadt Pau in Südfrankreich.* G. Lidy. (112) May 16.
Das Peltonrad im Wasserversorgungsbetrieb.* Carl Blecken. (112) June 1.
Ueber die horizontale Filterung von Trinkwasser in Frankreich.* Gaulthier. (112) Serial beginning June 1.
Ueber das ausserordentliche Wachstum von Algen in Trinkwasser der Stadt Dublin (Irland). Johnson. (112) June 1.
Die Desinfektion von Trinkwasser mit Chlorkalk. K. Imhoff. (112) Serial beginning June 16.
Ueber die Arbeiten am Bau der apulischen Wasserleitung in Italien.* (112) Serial beginning June 16.
Die Hydrologie in der Südlichen Umgebung Münchens.* A. Thiem. (112) Serial beginning June 16.
Die Wasserversorgung in Belgien. Felix Putney. (112) July 16.
Ueber den jetzigen Stand der Zentralen Grundwasserversorgungen. G. Schönke. (112) Serial beginning July 16.
Die Erweiterung des Wasserwerkes der Stadt Gössnitz (S. A.).* Herzner. (112) Serial beginning Aug. 1.
Ueber die Wassermesser in Frankreich. G. Lidy. (112) Aug. 1.
Ueber die Blachersche Kaliumpalmitat-Methode zur Bestimmung der Härte im Wasser. W. Pflanz. (112) Aug. 1.
Die Verunreinigung von Grundwasser durch die Abwässer der Gasanstalten.* G. Metge. (112) Aug. 16.
Heberwehre als wirtschaftliche Hochwasserentlastungsanlagen für Sammelbecken.* Jul. Fiedler. (53) Serial beginning Aug. 21.
Nochmals ein Beitrag zur Frage der Brunnenergiebigkeit.* M. Rother. (112) Sept. 1.
Die Wasserversorgung der Stadt Soignies.* Felix Putzeys. (112) Serial beginning Sept. 1.
Chemische und bakteriologische Kontrolle des Breslauer Trinkwassers. Lührig. (112) Oct. 1.
Die Wasserversorgung der Stadt Swinemünde. Clemens Dörr. (112) Oct. 16.
Durchführung der Nabburger Wasserleitung unter der Naab.* Dittmar. (112) Oct. 16.
Die Wasserversorgung von Rom. Tito Giardi. (112) Nov. 1.
Die Wasserversorgung durch Talsperren. Aug. F. Meyer. (112) Serial beginning Nov. 1.
Betriebsordnung des Wasserwerkes von Worcester (Verein. Staaten).* Herzner. (112) Nov. 16.

*Illustrated.

Water Supply—(Continued).

Die Wasserreinigungs-Anlage in Hoorn (Holland). (112) Nov. 16.
Beschreibung der Breslauer Wasserversorgung.* Debusmann. (112) Dec. 1.
Die chemische Zusammensetzung der artesischen Wässer Nordböhmens. J. E. Hibsch. (112) Dec. 1.
Wassermesserunterhaltung. Hache. (39) Serial beginning Dec. 5.
Der Bau von Talsperren in Italien.* L. Luiggi. (112) Dec. 16.
Verfügbare preussische Wasserkräfte. Sympher. (40) Dec. 16.
Abriss über die Grundlagen der Hydrologie.* G. Thiem. (112) Serial beginning Jan. 1.
Die Vorarbeiten für die Wasserversorgung der Stadt Lucca in Italien.* Giovanni Cuppari. (112) Jan. 1.
Die Filterwerke für die Trinkwasserversorgung der Stadt Alexandria i. Agypt.* (112) Jan. 1.
Alte und neue Wassertürme.* E. Prinz. (112) Jan. 1.
Die Einwirkung der Bestandteile des Grundwassers auf Eisenbeton. P. Rohland. (112) Jan. 15.
Die neuen elektrischen Pumpen des Wasserwerks der Stadt Bordeaux.* G. Lidy. (112) Jan. 15.
Die neue Wasserleitung von Los Angeles. Ed. Imbeaux. (112) Jan. 15.
Die Talsperre der Wientalwasserleitung bei Unter-Tullnerbach, eine technische und wirtschaftliche Studie.* Artur Oelwein. (53) Serial beginning Jan. 22.

Waterways.

Construction Details of the Panama Canal Lock Gates.* R. A. Pendergrass. (58) Nov.
Groynes and Sea Walls.* A. T. Walmisley, M. Inst. C. E. (104) Jan. 29.
Artificial Control Sections for River Measurement Stations. John C. Hoyt. (36) Feb.
Construction Work on the Cayuga and Seneca Canal.* L. S. Hulburd. (36) Feb.
Electric Suction Dredge with Special Cutter for Gumbo.* (13) Feb. 4.
The Improvement of the River Trent.* (12) Feb. 5.
Earth Excavated for Less than Six Cents per Yard. (14) Feb. 6.
Proposed Method of Enclosing a Stream in Reinforced Concrete Conduit Through Mansfield, Ohio.* Charles L. Bushey. (Paper read before the Ohio Eng. Soc.) (86) Feb. 10.
The Improvement of San Francisco's Water Front.* (13) Feb. 18.
Suspended Fenders a Feature of New Reinforced-Concrete Piers at San Francisco.* Frank G. White. (14) Feb. 20.
Breakwater and Ferry Landing Construction at Carleton Point, P. E. I.* (96) Feb. 25.
Les Voies et Moyens de Communications au Maroc Occidental.* J. Legrand. (32) June.
La Nouvelle Ecluse du Canal du Sault Sainte-Marie (Etats-Unis).* (33) Jan. 30.
Der Grossschiffahrtsweg Berlin-Stettin. Artur Oelwin. (53) Nov. 13.
Natürliche Querschnittformen der Wasserlaufe.* Franz Kreuter. (53) Dec. 25.

*Illustrated.